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BRITISH JUNGERMANNIÆ.

BRITISH JUNGERMANNIÆ:

BEING

A HISTORY AND DESCRIPTION,

WITH

COLORED FIGURES, OF EACH SPECIES OF THE GENUS,

AND

Microscopical Analyses of the Parts.

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INTRODUCTION.

To a work, professing to give a description of the various species of *Jungermannia* yet ascertained to be natives of the British Isles, it appears desirable, if not indispensable, to prefix, by way of introduction, a short historical account of the genus itself, accompanied with some remarks upon its structure and peculiarities, and a few observations on those families which are most nearly connected with it.

SECTION I.

History of the Family.

The earlier botanists, who have taken notice of the plants belonging to this genus, have almost universally designated them by the appellations either of *Musci* or *Lichenes*. By the latter term, Pannius Columna has described the first *Jungermannia* that we find any where upon record, his "*Lichen alter minor caule calcato*," being very obviously, both from the description and figure, intended for our *J. epiphylla**, to which Dillenius and other subsequent writers have referred it.

It was not till the beginning of the last century, that the name of *Jungermannia* was first adopted, a name given by Ruppini†, to perpetuate the memory of Lucia Jungermann, a German botanist, who was born in 1572, and died in 1653, after having published a catalogue of the plants of the neighborhood of Akerf, and a work entitled *Comaropia Flora Germanica*. He likewise gave considerable assistance to Besler, in his *Hortus Egerietensis*. In the *Flora Jenensis*, however, we find no particulars relative to the characters of this new genus; nor do we, till Dillenius, imperfectly indeed, described the fruit of it in the *Epil. Nat. cur. Cent. v., vi.*, and in the Appendix, p. 52, and again in his *Flor. Ger.*, where he attributes to this tribe of plants, which he calls *Lichenastrum*, "*Capitula monoececa (quibus et pediculis brevioribus a Lichene differt), aut nuda, aut folliculo inclinata, aut petalodes quid habentia, florem nempe monopetalum quadrifidum hiantia, que etiam loco apicis fecundationem conciliarent plantis, licet semina desiderarent.*" p. 54. He farther speaks, in the Supplement of the same work, of a double covering to the young capsule, evidently alluding to the calyx and corolla, as they have since been termed.

* In his "*Minor organismorum varietatibus nostro cultu videretur divergens erigenda in*" &c. Roma, anno 1676, tit. p. 356.
† *Flora Germanica*.

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Willott has described three plants under the name of *Nigotroa* and *Nigotrochis*, but has added little to what Dillwyn had done, except nothing, in many instances, the regions, and the wonderful composites.

Our countryman, Ray, is more particular in the request "Lactucastrum?," he says, "et Hæm. græca herb. vel, a plant. Cardus arvens, caput capitula longiusculis pediculis internodiis per internodia in quatuor phytisque angulis portis. crassiusculis fœcis rubriculis, ad basin usque dividentur. et laticem mutant truncatam, apertam in Cardus prostratissimas pedibus compressis, hinc in usum per reliquas Hæm. designat quatuor, cum capitulum pedibus multum parvis digitis et aperturam oblongis, et ornato ovale rotundum. Lactucastrum simplicius et hinc cum capitula, angulis arvens angulis pediculis plus minusve longa stipitata, et angulis ante simplicius, multo brevior, cum in plures partes per internodia divisi aperturam, quibus a Lactuca clausius designatur hoc genus." This, however, includes our genus *Helianthus*, which forms the first division "Lactucastrum capitula lobatis et aperturam." His second comprises our *Jungfermannia* "Lactucastrum capitula in quatuor organum lobata, longiusculis lobis et pedibus et aperturam" and this is subdivided into "Folia ovata et aperturam divisa" our *Jungfermannia frondosa* and "Folia ligula angulis divisa" comprising the *Jungfermannia alba*.

Marsh, with his natural talent for discrimination, has divided the given *Jugosa* names into three, but has taken characters from the habit of the plant, rather than from the fructification, which unfortunately will not bear him out. His first genus, *Morinda*, for *Jugosa morinda frondosa* "est planta grama flore sempiterna, composita, patens, in quatuor profundas partes divisa: ex quibus quatuor petala composita videntur et alibi, filamenta aut petala, non character Colubus, staminibus brevibus, et polyandris, cum in medio, cum ad extremitatem distans. Idem vulgo vocat, et petala nuda, in a vagis tubulis agrotis." Capula nuda, minutis petalibus et plantis plerumque non barbatis, in tubulis squamis per totam loborum superficiem, in alio vero per totam circumferentiam circumdatis in quibus cum staminibus et tubulis habet colore. And then, though it may at first sight appear the most natural of the three, yet is even variable in point of its fructification in the different species of which it is composed. What has, the second genus, *Jugosa-morinda*, is "a *Morinda* brevior, habitus in nervis bene videtur Triumfemum et Polygala cum quatuordecim angustis. Semina in lateralibus planis partibus videntur" and in third, "*Morinda*, in vix, "est planta grama et *Jugosa-morinda* distans, tubulis trifloris, quatuor vel quinquaginta lobis ordinibus vixit. tubulis vixit ordine oppositis cum tubulis minoribus. Semina sunt in tubulis loborum parte ad extremitatem in uno squamulis oppositis tubulis, qui lobulorum lobulorum composita formam per se habent, per tubulos vel per phloem cum tubulorum angustis vixit." Thus, in *Jugosa-morinda*, the author has taken the genus and as *Morinda* and *Morinda* the authors, for the words and has made the character depend, in a great measure, upon their respective situations. The example he supplies a *quadriflorus, compositus, nuda et nuda* leaves

* *How Many Words Did You Write?*

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A slight alteration only is made by Haller who, in his *Enumeratio Stirp. Helv.*, retains the genera established by Michxli, counting, however, the seeds in their characters, and adding to *Morales* the peculiarity of the frumens being rolled in and adhering, like a sponge, to the middle of the flower (capitula), which, indeed, is by no means the case with any of the family except *J. repens*.

Haller's next comes again to be considered, in his *Historia Muscarum*, where he has given a more enlarged character to his *Lachenianum* and after saying that the name is derived from the resemblance of its flowers to those of a Larchen, adds that it is, "Musci genus flore anthracaceo nudo, aliis nudo glabro, dens in quatuor laciniis ad basin usque diviso, tetrapetaloidi. Internodia breviter retrorsim. serratim spargente tenerum masculinum, et pedicula tenera pelucida, unguis singulis insidente. c. theca seu calyce nudo simpliciter et integro, non quamvis leviter, nudo in plures acutius per minutatim divisio egrediente quibus nullo a Larche characere distinguitur hoc genus. Fructibus sedibus hic adhuc latent in pennisque omnibus apertibus. It has, however, excluded *J. Fruchmannii* of which he does not appear to have known, he fructification, and has made it a *Urtica*, from the powdery caputula which he saw at the termination of the branches.

Lamarck, at length, in the last edition of the *Systema Naturae*, firmly established the genus *Jungermanniana*, and attributed to it the following character

"Musci pedunculatus, nudus. Anthera quadrivalvis.

Sem. sessile nudum, seminulum subrotundum.

About twenty-five years subsequently, in 1760, the accurate Schumacher produced his *Dissertatio de Jungermannia charactere*, in which, after an elaborate history, he determined upon the following character: "*Jungermanniana* hec est. Vocamus Alut genus, in cujus

MASCULINA Flores variis alius, vel in eadem vel in distinctis plantis non raro,

Cal. nullus

Cor. nulla

Sem. Antherae nudae, reticulatae vel laciniae, absque filis.

FEMININA Flores

Cal. multiflorus, monophyllus aut bilobus.

Cor. monophylla, limbo variè recto, frequenter lobulato.

Pin. laciniae cristata vel subrotundum corollae lacinia, Stylus corollae impositus, rectus. Stigma amphioxum.

Per. Pannulum pedunculo recto, ultra calicem et corollam elevatum, subrotundum, vel oblongum, nudum, filamentis repleto, quadrivalve, valvas patentibus.

Sem. Plurima minuta, subrotunda.

Haller in his *Stirpes Helveticæ*, has altered the character which he had previously given in his *Enumeratio* taking advantage of the labors of Michxli, Lamarck, and Schumacher, making no mention, however, of either male or female fructification, but very properly including in the genus those *Jungermannia* which Lamarck and Schumacher had made *Musci*, and observing, "*Musci Jungermannia, forte et omnes, praeter paucos*

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fruticosa glabulae gurgul, vel sessile, vel pediculate, quarum istas Linnaeus Minia accenset. Cùm tandem verum vaginam cavam, verumque florem quadrifidum, non asperulam calyptrariam gerant, melius utique cum *Jungermannia* manent." *Hall. Herb.* iii. p. 37.) Yet, on the other hand, he takes in *Raria fluitans*, whose fructification, however, it should be acknowledged, is to this day unknown.

Hedwig has studied, with his accustomed accuracy, this genus, confirmed many of the observations of Schimper, and made known other new and important facts relating to the organs of fructification—among these is that alluding to the vegetation of the seeds of *Jungermannia*, which completely controverts the opinion of those botanists who have supposed the capsules to contain the farina peculiar to the male flowers.

The generic character, given in the Appendix to the *Spermiacearum* of this author, stands thus:

"*JUNGERMANNIA*. Perigonium monophyllum vel nullum. Calyptra filis peristoma. Sporangium quadrivalve, spororum fila linearia, torta.

Spermatocystidia ovata vel globosa, cingulo pellacide simplici vel articulo vel nullo munita, solitaria vel gregaria, sessile vel pedunculata, superficiem trunci superiori vel inferiori adnata, vel substantie immersa, nuda vel folio perigoniali cincta.

Perigonia feminea varie figura, compresso-truncata transversa et lacurva, vel compresso-ovata margine dentata, vel compuncto-undulata. In speciebus perigonia distincta, perigoni vices gerit calyptra filis." and he adds, that, by characters taken from the perigonia and the *spermatocystidia*, the *Jungermannia* may perhaps be divided into many genera.

The author that next merits our consideration is Schreber, who, having industriously selected the most striking characters from the writings of preceding botanists, has thus defined the genus:

Mascula Flores sessile in caule, foliis, frondibus glomerati.

Cal. vix alba.

Cor. nulla.

Stem. Filamenta vix alba. *Anthera* ovata, unilocularis, apice dehiscentes.

Femina Flores in eodem vel distincta plantis.

Cal. Perianthium erectum, tubulosum, truncatum, crenatum s-laciniatum.

Cor. Calyptra sessile, perianthio minor, subglobosa, undique clausa, membranacea, laevi, stylo coronata, tandem apice rumpens.

Pist. Germen oblongum, calyptra abbreviatum, sessile, *Stylus* brevis, rectus, per verticem calyptrae transiens, *Stigma* simplex.

Peric. Capsula sem longu tenuius insidens, globosa, unilocularis, tandem longitudinaliter dehiscentia in *Valvulas* quatuor, aequales, patentes, persistentes.

Sem. plurima, globosa, adherentia filis tortis, elasticis, valvulis in fundo, apice, disco vel margine adfixis.

He likewise alludes to the *Jungermannia aculeata*, which, he says, have their *anthere* buried in the substance of the frond, and want a perianthium to the female flowers; on which account he doubts if they ought not rather to be considered a distinct genus.

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Roth has scarcely made a less excellent use of the labors of others, and has drawn up a concise account of the different parts of the fructification, summing up the whole in the following words:

4. Լոր. ստորագրեց, երեք ոսկե լամպ ու արկղակներ, չորս ձեռնաբաց ձեռնակ
զանազան բնույթի: Դիտարկեց իր և Գևորգ ԿԵՐԵՍԻՆԻ:

After the valuable discoveries of Schmidt and Hedwig, with the satisfactory results they had assigned for what they supposed to be the male and female fructification, it is rather surprising to find an able naturalist of our day, M. Pabst de Beauvois, conceiving their system, and establishing a theory of his own, according to which he considers the anthers to be the female fructification, and the capsules the male, and gives characters almost wholly from the former, where either to find or fill in species, but I have had the opportunity of examining. Thus, he has restored the *Michelia* genus, *M. odorata*, to his *Flore d'Orient et de l'Inde*, but changed its name to that of *Largesiphonum*, and gives the following character:

* Flores blancas, los pedúnculos distintivos pedunculados glabros con ovario cuadrifido. Los pétalos iguales, innatis filamentosos y antenas filiformes articuladas, por venturas. El fruto vegetativamente similar a las bayas pedunculadas blancas glabras, tomentosa interiormente, pilosidad vagamente vellosa, con pedúnculo corto. Anisocarpio, cápsula formada por el cáliz.

"**FC «Сибирь»** – 10 летия инициатива Фрэнсиса Оуэна, във връзка с 10-годишния педогогическият семинар в Бърмингем и Лондон. Семинарите, със съдействието на Британския Илустриращи Идентичност Ръководителите сега са изцяло английски и американски инициативи.

Flower it appears, as well as the more character of its genus, as from the species the author enumerates as belonging to it that he has assigned to the female (or male) fructification of *J. albicans*, *J. polyphylla*, *J. distans* are all suggestive marks which they really have in common with all the rest of the species except *distans*, which he says that their elastic filaments are "terminal" - surely does not hold good in any species. And in describing the male fructification our female - its character would be such as to include, I think I may say, all the *Jungermannia* species, were it not that he states the "filaments to be crumpled peristylous acuminate, a peculiarity which I cannot find to exist in any species, and certainly not in any of those he points out as belonging to this genus - and even his own *Carpedodictum distans*." With specimens of which he himself obligingly favored me.

The genus *Mursted*, likewise, he has adapted under the name *Rhizophyllum*, and proposes treating of it in a part of his *Reinholdiana*, which is, I believe, not yet published. A short notice of it, however, is given in the *Flore de Ouzed et de Semis* already mentioned, where he thus speaks of it, and of his *Conanthes Jagermanniana*, Mich. "Nous ne pourrions sans plus nous étendre que, dans le *Rhizophyllum Mursted*, Mich. les fleurs féminelles ou semencères sont séparées sous l'épauvette tantôt à l'ex. restant des lobes des feuilles, tantôt dans toute leur longueur que dans le *Conanthe Jagermanniana* Mich. ces mêmes fleurs ou semencères sont unies et rassemblées en boules au sommet de quelques

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rameaux, ou des feuilles, dans quelques espèces, et que, dans le *Carpolepedium* (*Muscoides*, Mich.) ces mêmes graines ou fruits sont solitaires, cachés sous des écailles imbriquées et distinctes des feuilles."

In the first and last genera here mentioned, M. Palisot de Beauvois decidedly speaks of two anthers, but in his *Commentaire* he deduces characters of equal importance from the gemma, which he supposes to be capsules (our anthers), and wholly passes over the true anthers, which are precisely of the same nature as those of *Carpolepedium* and *Rhytophyllon*, and are to be found with equal facility as they are in those species.

The character given by Mohr, in his *Fl. Crypt. Germ.*, is, perhaps, the best that has yet been assigned to the genus "Plantæ Cryptogamæ. Ord. vi. Calyptrata. B. Deoperculata. Sporangium quadrivalve (ex anomalâ interdum 3-valve.)"

Wahlenberg is almost equally happy in his definition. "Musci Hepatici. Capsula sine operculo, longitudinalitèr dehiscenti, inferè tantum calyptrata.

FRUCTIFICATIONES dioiciæ, rarissimè monocliæ steriles pulveraceæ in apice ramulorum vel foliorum.

Fructus Calyx Perichætium sacculiforme membranaceum vel carnosum.

Gemma calytrâ tectum, stylicerum, in perichætio sessile.

Capsula in pedunculo subito elonganda et caduca, univalvis, lacinaâ quatuor dehiscenti. *Semina* inter fila spiralia elastica."

And, lastly, Schwaegrichen gives the following character to his genus *Jungermannia*, in his *Prodrömus Hist. Musc. Hepat.* "Theca quadrivalvis, nuda, seta hypostita. Semina clatèræ lineares."

SECTION II.

On the different Parts of a Jungermannia.

I. ON THE ROOTS, STEM, LEAVES, AND STIPULES.

We shall begin with speaking of the

ROOTS,

Roots. Since they are the parts of a plant, by which it is principally nourished and supported. These are of two kinds such as are composed of minute, simple, or rarely forked*, fibres, and such as seem to be a continuation of the stem itself, equalling it in thickness, and, like it, frequently branched.

* As in *J. trichota* (n. 76).

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And first, of the more common fibrous radicles, of which it is rare that any individual *Formae* of the genus is entirely deprived. It is true that, in plants which are upright in their ^{Roots} growth and rise above a crowded together such as *J. fasc.* and *J. repens* they are characteristic in a measure of a very careful examination. In one instance of *J. pinguis* (tab. 30. 4th) I have been unable to discover any vestige of such, but these were floating in the water. For the most part in a large herb roots on the underside of the stem or frond, a few species which are terrestrial leaves, and always, a short distance upon the stem of the plant have a distinct hairs. If otherwise as in the case of *J. pinguis* and *J. pinguis* they grow indifferently from various parts of the stem surface.

The highest stem of a watercress have added on to describe its pecuniary structure of structure in these fibres. They seem to be tubular throughout, never exhibiting any appearance of joints or concatenations, seldom smooth semitransparent, and of a very delicate membranaceous texture. In general they are colorless or only tinged with light brown, such that they might be supposed to derive their color from the soil in which they grow. *J. pinguis* (tab. 30) is remarkable for the deep purple hue of its roots, and those of *J. repens*, *J. hystrix*, and *J. ventricosa*, not uncommonly partake the same tint.

Among the aquatic and species of *Juncaglossum*, the roots generally grow in bundles, issuing immediately beneath the stipules. In the *J. stipulata*, they are thrown out indifferently, and in a more copious manner from any or every part of the stem and branch, even from those branches proper to be fructiferous, as in *J. fructifera* (tab. 78) *J. repens* (tab. 30) &c. Even the rays of *J. pinguis* (tab. 30) from its upper part send forth a few radicles, but the hairs which invest the roots must not be mistaken for roots, since their direction is upwards, whereas that of the roots is always descending.

I have said that the origin of the roots, in most instances, is on the stem. As in the *Hydrocotyle*, so in the *Juncaglossum*, an instance or two of these roots proceeding from the lobes, as may be seen in *J. complanata* (tab. 61).

In *J. polyphylla* (Nappi tab. 1) an example is found of the fibres being united in close fascicles, so as to appear like one thickened root. What I have described as such, I am now inclined to consider *stipules* of a singular nature to those that are seen on *J. tridactyla* (tab. 78) and, and ed, I have observed some appearance of lobaceous scales upon two or three and in such.

Mr. Lye has directed my attention to a singular dilation at the lower extremity of many of the radicles in *J. amomum*, twice or three the diameter of the radicle itself, and which I am disposed to look upon as a rhizome in that part.

Roots of the larger kind, based at in the beginning of this section, were rarely *Stipules*. We have instances in *J. repens* (tab. 30) *J. complanata* (tab. 61) *J. elongata* (tab. 30) *J. hystrix* (tab. 31) and in *J. emarginata* (tab. 37). In the second, third, and fourth of these species, these roots were horizontal, in the rest they descend, and are sometimes branched, often themselves sending forth fibrous radicles. In all these there is no difference in structure from the stems, but their color is paler, generally whitish, and they are very succulent.

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There seem to answer to the "*Radix primaria*," which Hedwig describes in the *Musci*, and the "*primordialis*" of Bridel whilst the fibrous ones are the "*Radix secundaria*" of the same author. The former are thus defined by him "Quoad originem, radices sunt vel primordiales, quas a semine in plantulam explantatione præsertim fuerunt, vel secundariæ, quas rariis partibus sub indurata diversis temporibus nascunt. Radix autem primordialis, præsertim ad radice et crumenculo sit, non raris in spinis tantum sit constituta, ut viz dignoscere quousq. ibi hæc incipiat, illi desinit." (*Prod. Musc. Hist.* i. p. 8.)

All the species that I have yet observed to possess "*Radix primordialis*," are nearly erect in their mode of growth, and are found growing in earth, where these roots penetrate to various depths, or creep horizontally just beneath the surface. In those species which are prostrate in their place of growth, the fibrous roots alone are found, and, by means of these, they are more or less firmly attached to soil of various kinds, to rocks, trunks of trees, and decayed wood or to houses, and even other *Jungermannia*. *J. platyphylla*, and, probably, all the individuals that are so densely unbristled, send forth roots, which strike into the leaves of their own stems over which they happen to lie, and from them appear to draw nourishment (See Suppl. tab. 8.)

STEMS.

Stems. The stems of *Jungermannia* may likewise be separated into two kinds, such as are furnished with leaves (the *Jungermannia foliosa* of Authors), and the *Jungermannia fruticosa*. *J. pusilla* (tab. 68) and *J. Blasia* (tab. 99, 69, 64) seem to be intermediate, but, in general, the character is very clearly improved upon the plants, and they may be distinguished by their first aspect.

Form and Distribution. The first are by far the most numerous in point of species, and are, for the most part, cylindrical, or tapering gradually towards the extremity. In *J. torus* (tab. 16) they are depressed. erect in their growth in *J. Blasia* (tab. 99), *J. sphæroides* (tab. 19), &c.; and procumbent in *J. bacculata* (tab. 11), *J. hysteros* (tab. 19), and many others. simple in *J. laevigata* (tab. 18), *J. exilis* (tab. 9), *J. asclepis* (tab. 19) slightly branched in *J. pusilla* (tab. 17), *J. pusilla* (tab. 68) very much branched in *J. denticata* (tab. 5), *J. Mochus* (tab. 34), and *J. verruculifera* (tab. 42).

In general the branches are irregularly scattered, but in *J. reptans* (tab. 75), *J. Wandia* (tab. 66), and *J. Tamarici* (tab. 4), they are pinnate or bipinnate. sometimes the stems are dichotomous, as in *J. squarrosa* (tab. 34).

Innovation. Besides these branches, which, if I may so express myself, unfold themselves with the regular growth of the plant, innovations are very frequent upon the stems of *Jungermannia foliosa*, and it is probable, that almost every species, at some or other period of its existence, produces them. Instances may be seen in *J. hysteros* (tab. 43), *J. compressa* (tab. 30), *J. crassulata* (tab. 37), &c. There must be carefully attended to. or, otherwise, from the shooting forth of an innovation immediately beneath a calyx, the fructification will appear lateral, which is, in reality, terminal.

Stems. What I have said of the stems of the *Foliosae Jungermannia*, applies equally to the species *fruticosa*, except that, in them, the stems, or stems as they are called in these, are

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rarely cylindrical. In *J. pubescens* (tab 78) and *J. foveata* (tab 33) they appear to be so, but in *J. filosa*, *J. pinguis*, and *J. multicaulis*, they are much depressed. They are prostrate or procumbent in *J. laetitia* (tab 77), *J. heteromera* (tab 79) and most of the *Banksia* series in *J. multicaulis* (tab 45) in which stems likewise occur catypose of vagus and regularly pinnatifid ramification. In *J. foveata* (tab 33) the branches are dichotomous. In the same plant, too, and in *J. laetitia* (tab 77) and *J. cyathifolia* (tab 47) taprootlets are very common.

The principal difference between the *Jungermannia fruticosa* and the *Jungermannia Jungermannia* *tabulae* consists in the stems of the latter being provided with peristomes, which, from their similarity to the leaves in the phanerogamous plants, are distinguished by the same name, whilst, in the former, the stems are either wholly naked, or are furnished with marginal expansions throughout their entire length, which, though of the same nature as the leaves, and though short and even pinnatifid, as in *J. filosa* (tab 82) are never so deeply cut as to entitle them to that appellation. Among these may be reckoned *J. cyathifolia*, *J. laetitia*, *J. heteromera*, *J. incana*, and *J. pubescens*; and, of the naked stemmed species, *J. pinguis* and *J. multicaulis* are the only ones with which I am acquainted.

The structure of the stems is very simple and altogether cellular. The cellular structure of small, separated by thin pellucid membranes, their length oblong, and their subspinescences filled with a starchy fluid, mixed with extremely minute granules, of a green olive or purple color, when a plant is in a gas which consequently gives the same tinge to the surface of the stems. When these are of a dirty, unpolished green, probably from an injured and decayed state of the water collation, and the stem then becomes brittle, or is otherwise pliable, and in the younger plants, even flaccid.

THE LEAVES.

The leaves of *Jungermannia* vary remarkably in their insertion, direction, and figure, leaves and generally afford excellent specific marks of discrimination among the species.

No instance whatever is known of the leaves of these plants being situated on foot stalks; they are always sessile, and are even contracted at the base, but, in many instances, as, for example, in *J. cyathifolia* (tab 47) and *J. pinguis* (tab 44) they are decurrent. In almost all the species with bifarious leaves, they have an oblique insertion, that is to say, one angle of the base is fixed in the back of the plant, whilst the opposite one is free before it; thus, the leaf is obliquely sessile. In the species with multifarious leaves, such as *J. filosa*, *J. heteromera* (tab 79) &c. the base half embraces the stem transversely. In *J. pinguis* (tab 44) the leaves have their base running parallel with the stem.

In all the plants with bifarious leaves, either the upper or the inferior series of the subrotation stem is more or less controlled by the imbrication of the leaves, and these two kinds of imbrication afford excellent characters for subdividing the genus. Thus, in *J. laetitia* (tab 77) and *J. laetitia* (tab 77) the imbrication is inferior, whilst in *J. filosa* (tab 82), *J. heteromera* (tab 79), and *J. foveata* (tab 33) it is superior.

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The bilobed insertion of the leaves is by far the most common, as in *J. acrophylla* (tab. 10), *J. ovata* (tab. 31), &c. *J. pulchra* (tab. 31), *J. laevifolia* (tab. 30), and *J. juniperum* (tab. 4), have them quadrifid, and in *J. flexilis*, (tab. 64) *J. brachyphylla* (tab. 7) and *J. nitens* (tab. 5), they are multifid, that is to say, they grow indifferently from all sides of the stem.

Position. The direction of the leaves is liable to considerable variation, even in the same species. In those with leaves disposed in whorl-like directions, they generally point upwards, towards the extremity of the stem, whether that be erect, as in *J. flexilis*, or prostrate, as in *J. nitens* (tab. 5). Such however is their direction in some species with bilobed leaves, of which we have examples in *J. marginata* (tab. 37) and *J. cuneolata* (tab. 3). Yet for the most part, the species of this section are adorned with leaves which are indifferently patent or erect, instances of which are seen in *J. annalis* (tab. 34), *J. Sphagnum* (tab. 33), *J. Taylori* (tab. 37), &c. In *J. juniperum* (tab. 4) they are remarkable for pointing all one way.

In every British species of the genus, the leaves are alternate and distinct. In two foreign species, from New Zealand, I have seen them opposite, united, and perfoliate.

Form. In describing the forms of the leaves, I must beg that the terms made use of may be understood with a certain degree of latitude, not only because some variation takes place in the leaves themselves, upon the same individual specimen, but because the terms in use for phanerogamous plants are not strictly applicable to those of this family. When mention is made of an ovate or of an orbicular leaf, the expression is so far narrowed, that, having a broad transverse base, in general, the circumference will not form more than three-fourths of an oval or orbicular figure. I allude to these forms more particularly, because they, and their various modifications, are the most frequent in which the leaves are subject.

They are ovate in *J. nitens* (tab. 30), *J. Trichomanes* (tab. 79), and in the upper leaves of *J. annalis* (tab. 34) — orbate in *J. quadrata* (tab. 14) — orbicular in *J. Sphagnum* (tab. 33) — subquadrata in *J. polytrichum* (tab. 38) and *J. pusilla* (tab. 39) — subreniform in *J. obtusa* (tab. 15) — ligulate upon *J. flexilis* (tab. 64) — linear upon *J. laevifolia* (tab. 64) — and ovate and orbicular leaves are frequently found on the same plant, as in *J. nitens* (tab. 34). In all, they are plane or convex.

In very many species they are more or less divided at or near the extremity. Slightly notched in *J. marginata* (tab. 37) and in *J. cuneolata* (tab. 3) — deeply as in *J. nitens* (tab. 30), *J. nitens* (tab. 30), *J. brachyphylla* (tab. 11), *J. latifolia* (tab. 33) — bifid as in *J. pulchra* (tab. 31) — deeply as in *J. juniperum* (tab. 4) — trifid as in *J. ovalata* (tab. 70), *J. repens* (tab. 70), *J. nitens* (tab. 30), and *J. repens* (tab. 30) — quadrifid in *J. setiformis* (tab. 32). In all these the segments are equal in size, and either expanded, as in most species; linear, as in *J. acrophylla* (tab. 10), or connate, as in *J. nitens* (tab. 30).

A considerable variety is to be observed in the apex of the leaves, which are rounded and obtuse in a great number of species — acute in *J. Dulcis* (tab. 60) and many others — acuminate in *J. juniperum* (tab. 4) and *J. acrophylla* (tab. 10) — very sharp, and almost

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eruptive and diaphanous in some states of *J. barbata* (tab. 70) but none of the grasses have ever, that I am aware of, a hair-like termination, which is so common among the leaves of the Monocots.

There are many species whose leaves are split into two segments of (generally) unequal size, and these segments are unduplicate, or more or less folded and appressed to each other. I say generally, because, in *J. compressa* (tab. 98), we have an example of nearly, and sometimes quite, equal unduplicate segments. In the rest they differ in size, and somewhat in figure. The division is slight in *J. acuta* (tab. 10) and *J. minima* (tab. 44) as some others, such as *J. complanata* (tab. 91), *J. Mertensii* (tab. 68), *J. lamellifolia* (tab. 81), and *J. cuneata* (tab. 66), the last might rather be described as having a small lateral appendage, which is usually revolute, than as being divided into two segments but a regular gradation from *J. cuneata*, through *J. angustifolia*, *J. Muhlertii*, and *J. complanata*, to those which are strikingly two-lobed, is an isomorphism, that it is not possible to draw a line of demarcation.

In other species the lobes are deeply divided, particularly in *J. nutans* (tab. 84), *J. platyphylla* (tab. 69), *J. undulata* (tab. 67), *J. nemosa* (tab. 81), and *J. pinnatifida* (tab. 67). In this last species, many of the leaves are divided down to the very stem, to so much that I have been led to describe the two lobes as distinct leaves, which, in fact, they are, in some parts of the plant, whilst, in others, subsequent ramifications have enabled me to discover these lobes united, and resembling an ovate form of *J. nemosa* (tab. 81), that I should be tempted to regard it as a variety of that plant, did not my friend, Dr. Taylor, who has gathered it on its native mountains, hold quite a different opinion.

In every instance, the larger segment or lobe is plane, or more or less convex, concavely so in *J. cuneata* (tab. 66) in *J. angustifolia* (tab. 68), *angustiformis*. The smaller one is more variable, being plane in *J. platyphylla* (tab. 69), *J. nemosa*, &c.: involute in *J. Muhlertii*, *J. complanata*, *J. angustifolia*, and *J. angustiformis*; concave in *J. angustiformis* (tab. 68), *J. elliptica* (tab. 1), *J. distata* (tab. 5), and *J. Tomariorum* (tab. 6).

The larger lobe is sometimes again divided, as in *J. Wendtii* (tab. 65) and *J. affinis* (tab. 65) in *J. angustiformis* it is united at the apex. The smaller one is, I believe, in every instance entire.

In all the kind of leaves the margins are for the most part entire—scarcely in *J. affinis* (tab. 18) and *J. nutans* (tab. 84) distant in *J. apiculata* (tab. 16) spinose-dentate in *J. quiescens* (tab. 12), *J. Muhlertiana*, and *J. Wendtii* beautifully ciliated in *J. nitens* (tab. 64) and finely hennate in *J. lamellifolia* (tab. 80).

If the structure of the stems be simple, as likewise is that of the leaves, for it is the latter even in both—a mass of cells, of a roundish or ovate figure, sometimes, from the diameters with which they are placed, appearing hexagonal. I cannot satisfy myself that there really exist any pores in these cells, though I have thought I saw traces of them in those of *J. juncea*. They are filled with a pellucid liquor, and colored greenish, green in the greater number of species, brown in *J. juncea*, and purple in some of the varieties of *J. nemosa*, *J. angustiformis*, and *J. compressa*.

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Cells. Sometimes the relative size of the cells will afford, in the absence of the frondification, tolerably good specific marks of discrimination. Thus, in *J. Taylori* they are very large—in *J. ulmifera* much smaller—and in *J. Sphagnum minus*, yet the form of the leaves, in all three, is nearly the same. When the leaves of the *Jungfermannia* have been dried, and are recovered by immersion in water, the cells are dark to the centre, and have a pellucid border around them, a circumstance which arises from the collapse of the plates, and accumulation of the granules, in the middle of the cell. Just the same takes place in the *Conferva*, between the structure of which, and that of the *Jungfermannia*, there seems to be a close analogy.

Stems. The leaves of all the species are destitute of every kind of hairiness or vascularity. In one of the frondose species, *J. pulchra* (tab. 78), the surface of the plant, both above and below, is covered with white, pellucid hairs.

In a variety of *J. homophylla*, I have seen the cells very prominent and pointed, so as to give the appearance of a curiously tuberculated leaf (See Suppl. tab. 3). In all the other species the surface is smooth, and even shining in *J. Sphagnum*, *J. hypnoides*, and *J. longica*.

Nerve. Now is there any thing which precisely answers with the nerve of Mosses in the leaves of these plants. The appearance of a nerve in *J. alluauii* (tab. 16), is only caused by the different form of the cells, narrower and longer than the rest—but they are not prominent on either surface, like the nerves of Mosses. *J. prostrata*, of Swartz's *Fl. Ind. Chr.*, has a nerve resembling that of *J. alluauii*.

Perigynal leaves. The perigynal leaves, or those which contain the anthers, in general differ but little from the rest, except in being more closely imbricated, and in having a swelling at the base where the anthers are lodged, as in *J. asplenoides* (tab. 13). Frequently these are wanting. In some of the frondose species, as *J. Lyallii* (tab. 77) and *J. heterocoma* (tab. 79), the perigynium is a scale resembling a stipule in the filicaceous species—and, in *J. farctata* (tab. 66) and *J. pulchra* (tab. 78), the anthers are inclosed within an involution of the frond, which is rolled up into a ball.

Petiole-like leaves. The petiole-like leaves, or those which surround the calyx, differ in general much more from the cauline ones. Even in the filicaceous species they frequently grow from all sides of the stem, as in *J. asplenoides* (tab. 66) and *J. emarginata* (tab. 97). They are wholly wanting in *J. Thuidioides* (tab. 76) and, in *J. obtusifolia* (tab. 98), *J. nemorosus* (tab. 91), &c., they usually differ from the rest. In *J. Huetii* (tab. 54) and *J. cuneolata* (tab. 8) they are very remote, and entirely embrace the young frondification, serving to answer the purpose of a calyx. In *J. jacquetiana* (tab. 4), *J. emarginata* (tab. 97) and *J. arifolia* (tab. 6), they are united at their internal margins, and appear almost converted into a calyx. In many species they are more cloth than the cauline leaves, as for example, in *J. Torreyi* (tab. 66) and *J. carnea* (tab. 8). In *J. cuneolata* (tab. 13) and *J. nitens* (tab. 9) they are pubescent. In *J. polytrichum* (tab. 89), *J. Sphagnum* (Suppl. tab. 35) *J. reptans* (tab. 74), and *J. trichota* (tab. 76), they resemble small anthers—and in *J. disticha*, *J. Torreyana*, *J. Marshallii*, *J. repylyfolia*, *J. homophylla*, and *J. nemorosus* (tab. 4, 6, 54, 66, 91, 98), the lobes of these are large and expanded, which, in the rest of the leaves, are small and meagre, or obsolete.

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STIPULES.

Besides the leaves just described, the stems of many species of *Jungfermannia* are furnished with small scales or foliaceous processes, which, by most authors, are denominated stipules. These, in every instance, are produced on the lower side of the plant, whether the leaves are imbricated on the superior or inferior surface. Where they exist at all they are generally found throughout the whole length of the plant, placed at equal distances, one between each pair of leaves: yet in *J. compressa* and *J. Späggii* they appear only on the younger shoots, and in *J. aculeata*, *J. Taylori*, and *J. maculata*, they are with difficulty to be discovered. They are widely subulate in the three last-mentioned species ovate and entire in *J. albicans* (tab. 72) of the same shape, and toothed or laciniate in *J. Blausi*, *J. stipularia* (tab. 41), and *J. viticulosa* ligulate in *J. levigata* and *J. platyphylla* bifid and entire in *J. Franchetii* (tab. 40), *J. cuneifolia*, *J. polyantha*, *J. monostachya*, *J. hamatifolia*, &c. bifid and laciniate in *J. Woodii*, *J. barbata*, *J. heterophylla* (tab. 31), and *J. bidentata* four or five toothed or lobed, with the lobes entire in *J. reptans* (tab. 73) and *J. tripartita* (tab. 75) lobed and ciliated in *J. ciliaris* quadrate and finely laciniate in *J. tomentella* (tab. 30). Their margins are usually plane, but recurved in *J. platyphylla* and *J. Tamarisci*.

II ON THE ORGANS OF REPRODUCTION.

A. On the Parts of the Fructification.

ANTHERS.

Under the denomination of the *anthers* of *Jungfermannia* Hedwig has described two kinds of organs, whose structure is extremely different. The one I shall have occasion presently to speak of, that which consists simply of pellucid granules, without any visible internal organisation, and which I have, I fear, inaccurately, in the course of my descriptions, described by the name of *gemmae*: the other is what I look upon to be the true anthers, at least as much so as the anthers of Mosses, with the structure of which there seems to be the greatest affinity, and especially with those of the genus *Späggium*. Like them they are nearly spherical in all the species, except in *J. Blausi* (tab. 69), where they are ovate or elliptical, externally composed of an extremely thin, pellucid, diaphanous, reticulated membrane, which reticulation is caused, in all probability, by cellulose, of which it is the boundary. Within it is filled with a fluid and mixed with a very minute granulated substance, generally of an ochraceous or greyish color, but yellow in *J. pusilla* (tab. 60), and orange in *J. Hookeri* (tab. 54) (viz, when the anther has arrived at a state of maturity, escapes through an irregularly shaped opening, which bursts at the extremity, and then the cuticle turns brown and decays).

The *anther* terminates, in the greater number of species, a short filament, or white, pellucid, delicate, callous footstalk. In *J. pinguis* this footstalk is scarcely discernible, and

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In *J. epiphylla* and *J. Blaisi* I cannot find that it exists at all. The anthers appear not only sessile, but imbedded, in the latter species, in the substance of the nerve, and, in the former, on a lateral process or peculiar receptacle, varying as approximation to the genus *Mesochorus*. The funiculus is found in all the following species of *Jungermannia*.

In the freeborn species, the anther is, as just observed, sometimes buried in the nerve, sometimes it is affixed to the upper surface, as in *J. Lycopha* (tab. 77) and *J. heterum* (tab. 78), and sometimes to the lower surface, as in *J. furcata* and *J. puberula*. In either case it is covered by a proper perigynial scale.

In most instances the anthers are, in the following species, surrounded by closely-imbricated perigynial leaves each leaf inclining on indefinite number, from one to five or six. Sometimes they are to be seen on the old branches, sometimes, as in *J. platyphylla* (tab. 66) and many others only upon the innovations, which, after the decay of the anthers, become perfect branches. They are on some individuals, as *J. Hookeri* (tab. 34), in the axils of leaves that are not closely imbricated, and they are then exposed to view, but not so much as in *J. lanceolata* (tab. 10) and *J. pusilla* (tab. 60), where they are placed on the stem, without any covering or protection whatever. Frequently they are found on the same plant which bear the female frondification, but more usually on distinct individuals.

CALYX

Calyx.

As in the phanerogamous plants, so in this genus, species are to be met with that are quite destitute of a perichætium or calyx, as I have hitherto called it, of such, examples are seen in *J. cuneata* (tab. 8) and *J. Hookeri* (tab. 34). In *J. compressa* (tab. 36), *J. juniperina* (tab. 4), and *J. undulata* (tab. 58), the perichætial leaves, by their union, seem to perform the office of the calyx in affording protection to the germen within. This part, in the greater number of species, is single, very small and by no means concealing the calyptra in *J. furcata* (tab. 37) (where it is like a scale, as in *J. epiphylla* (tab. 47), *J. ovalifolia* (tab. 48), and *J. pygmaea* (tab. 68), where it is cup-shaped. In *J. polymorpha* (tab. 69) it is half the length of the calyptra, whilst, in almost every other of the genus, it is much shorter. Its most common figure is tubular, with the mouth, however, smaller than the diameter at the middle, as in *J. cerna*, *J. antiformis*, &c. In *J. lanceolata* (tab. 10) the apex is depressed, acuminate in *J. pusilla* is most a little plicata. In *J. asplenoides* (tab. 12), *J. muricata*, *J. complanata*, and several others, it is compressed, and, before the extension of the capsule, is curved at the apex and always a little slit down on one side. Angular in *J. crenulata* (tab. 37), *J. hypolea* (tab. 63), *J. Huttoni* (tab. 55), *J. mammosa*, and in *J. humulifolia*, in which latter the angles are often serrate-dentate. Compunctate in *J. pusilla* (tab. 60).

Mouth.

The mouth is generally roundish, toothed in many species, four cleft in *J. sphaerocarpa*, beautifully ciliate in *J. cuneata* and *J. trichophylla* truncata and flattened in *J. undulata* and *J. asplenoides*.

Substance.

The substance is, in almost all the species, very nearly the same with that of the leaves; membranaceous in *J. Blaisi*, approaching to verrucos in *J. bicinctella*, exceedingly so in *J. Trichomanes* and *J. obscurum*. It is smooth on the surface in every species, except *J. dilatata*, in which it is tuberculated.

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In regard to situation, the calyx is either terminal, as in *J. asplenoides*, *J. etna*, &c. or lateral as in *J. hemisphaerica*, *J. calyptraefolia*, *J. viticulosa*, and *J. Trichomanes* placed upon short lateral branches, as in *J. Tamariu*, *J. alluvion* (Suppl. tab. 8), and *J. Sphagnum* (Suppl. tab. 4); or upon short branches at the base of the shoots, as in *J. brachypoda* (tab. 11) and *J. comosa*. Lateral, upon the superior surface of the stem in *J. pusilla* arising from the lower side of the stem in *J. Sphagnum* and *J. trichomanes*.

The insertion of the calyx is in every instance, among the British species at least, terminal upon its base, so that it becomes erect, except in *J. Trichomanes* (tab. 70) and *J. viticulosa* (tab. 80), where the calyx is affixed to the stem by the side of the mouth and the calyx itself is then pendent and buried in the earth. I have seen a similar instance in a species brought by Mr. Monnier from New Zealand, where, however, it is terminal upon an upright growing plant, and, consequently, never buried in the soil, like our species.

Among the frondose *Juncgermannia*, we find two species which possess the peculiarity *Thuidium Capn.* of having a double calyx. *J. Igella* (tab. 77) and *J. heteromera* (tab. 70), of these, the outer is small and lacinated the inner much longer, and ovate or oblong. In one, it exceeds the length of the calyptra, in the other it is shorter. A still more remarkable circumstance takes place in *J. Illense*, where the calyx is imbedded within the substance of the frond (tab. 88). In *J. epiphylla* it originates on the upper surface, in *J. pinguis* and *J. multifida* (tab. 65) at the side, and in *J. furcata* from the under side of the nerve.

PISTILLUM

Of these there are from three to eight or ten which are immediately surrounded by Ploths. the calyx, or, in the absence of that, by the perichthet leaves. Their form is linear, and approaching to lanceolate in some species, but short and ovate in *J. pinguis*, *J. furcata*, and *J. multifida* their mouth is always slightly expanded. Their structure likewise appears to be cellular their color is whitish or pale gray with a few reddish longitudinal striae. One, or rarely two, of these pistilla is made fertile, and then the lower part swells, and becomes the germen, of an olive green color, whilst the upper remains on the style, varying in length in different species. Of this germen, the exterior part (which seems to have some affinity with the whorls of the *Carices*, constitutes what is called the

CALYPTRA

this consequently takes the form of the full-grown germen. It is membranaceous in *Capn.* the greater number of species, submembranous in *J. epiphylla*, *J. pinguis*, *J. multifida*, and *J. furcata*, but smooth in all, except the two last, of which, in *J. multifida*, it is lacerated, and in *J. furcata* blispid. When the germen is sufficiently large the interior part, now becomes the capsule. bursts with an irregular vertical opening at or near the summit, and the capsule elevated upon its whole, volubiles

PEDUNCLE,

is protruded to various lengths, according to the species, being very long in *J. epiphylla* *Retzsch.* and *J. pinguis*; short in *J. furcata*, *J. platyphylla*, *J. juniperum*, &c. In *J. heterophylla* it

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yet unfrequently happens that an unevenly torn portion of the calyptra is carried up with the capsule, as in the case in the green *Sphagnum* among the Mosses.

CAPULE.

Form. If a young capsule, before it has burst the calyptra, be examined, it will be found to be of an oval figure, exhibiting no appearance of valves. Within is even a pulpy substance, consisting of a cellular mass, filled with a pellucid liquor and numerous granules, of a dark or olive green color, varying in size and the whole traversed by twisted brown lines, formed by the spiral filaments.

When the capsule is protruded beyond the calyptra, the external part of it becomes hardened and the color generally deeper, brown, and glossy, the surface of the valves, too, are visible. The cellular substance and the liquor within, are then absorbed, and nothing is seen but the granules beneath the seeds, and the spiral filaments traversing them.

Form. The texture of the capsule is various, in the greater number of species almost membranaceous and pale brown in *J. platyphylla*, *J. Macleanii*, *J. pusilla*, and *J. apophylla*; quite membranaceous, white, and transparent in *J. aryphepha*, *J. lanceolata*, *J. rubiginosa*, and *J. minutissima*. In the last last mentioned species, the capsule opens into four valves or segments, which do not reach more than half way down the capsule. In *J. pusilla* it bursts irregularly into valves of various size, but in all the rest into four equal valves, extending to the very base. Sometimes as in *J. ligula*, *J. flabellata*, *J. juncea*, and, probably, some others, five valves are seen, and sometimes only three, but this may arise from accidental causes. In all those which are divided down to the base, the valves become quite expanded. In those species where filaments are attached to the apex of the valves, they are sometimes prevented from doing so by the arrangement of these filaments.

Structure. The structure of the ripe valves of the capsule has something remarkable about it, yet nothing, I think, but what might arise from a cellular formation, and the cellular becoming hardened. They appear to be created longitudinally, with cells placed at tolerably regular distances, and connected by more or less closely placed, transverse ones. These last may be the divisions of the cellular. Externally they have granules or foveolae on the surface of the capsule. Such, at least, is the case in the greater number of species. In *J. ovata*, and the curious little family to which it belongs, the capsule is irregularly reticulated, like the anthers.

Spiral Filaments. The spiral filaments that are found in the capsules of this genus, and some of the neighboring ones, are deserving of more attention. How they are attached to every specimen, I am wholly at a loss to discover. For, as general, after the bursting of the capsule they lie quite loose among the seeds. In *J. fusca*, *J. apophylla*, and *J. flabellata*, they are furnished of a simple hair, and remain, after the discharge of the seeds, attached to the extremity of the valves of the capsule. In *J. aryphepha*, and in numerous, the point of attachment is the same, but the hair is double and enveloped by a thin, pellucid, cellular membrane. A cellular membrane envelopes the long filaments of *J. apophylla*, which are attached, after the discharge of the seeds, to the central base of the capsule, where they have a beautiful tail or point. It is possible that this membrane may exist in all the

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species, in a young state of the capsule, at which period I have sometimes seen it in those in which I have looked for it in vain when the capsule has been ripe.

The substance of the spiral filaments is, as far as their extreme minuteness will allow ~~us~~ me to judge, nearly the same as that of the capsule itself, their color brownish or fawn and opaque; they are narrowed at each end, and compressed they are short in *J. pusilla*; very long in *J. epiphylla*. In all cases they have a strong elastic force, becoming more closely twisted and contracting with heat and dryness, and expanding with moisture. On the bursting of a capsule, they are instantly, from their exposure to the dry air, put in action, and, by their elastic impulse, discharge the seeds with a sudden motion to a considerable distance, whence they have merited the name given them by the Germans of *seed-dispersers*.

SEEDS.

The seeds themselves are, for the most part, spherical, numerous, minute, brown, both and opaque, smooth in the greater number of species, rough in *J. pusilla* large, and comparatively few in number, in the capsules of *J. montana*, and of an oblong shape, and a green color. Hedwig has seen the seeds of *J. epiphylla* vegetata, and his account will be found under my description of that species.

II. Of the Gemmae.

Besides the means of increase by seed, some of the *Juncgermannia*, like most other common cryptogamous plants, possess the property of propagating their kind by gemmae, in the same way as many species of *Allium*, *Polygonum viviparum*, &c., among the phanerogamous plants. Of these I have treated as much as was in my power under the description of those species which I have found to be furnished with them, so that I have but few words to say upon the subject here.

Hitherto I have found *true gemmae* only upon a few species. In *J. montana*, *J. epiphylla*, *J. hematifolia*, and *J. calyptrifolia*, they appear to be produced upon the stems. In *J. complanata* upon the margins of the leaves. In *J. furcata* upon the extremity of the frond, and in *J. Illinoia* within proper tubular receptacles. In all they precisely resemble in structure the leaves or the frond of the individuals which produce them. In the first two, as well as in the last-mentioned species, they are spherical. In *J. complanata* and *J. furcata* more or less oblong. Those of *J. furcata* may without much difficulty be observed in their progress towards perfect fronds and those of *J. Illinoia*, even before their escape from the receptacles, are endowed with roots, and their development into perfect plants has been detected by the acuteness of Schüdel and Hedwig.

I remark that I have called by the same name bodies of a much more simple and less organized structure, which are found on the leaves of *J. incisa*, *J. ventricosa*, *J. erradema*, *J. nemorosus*, &c., and on the ends of the branches in *J. Sphagnum*, (Suppl. tab. 8), *J. Trichomanes*, and *J. barometrica*, &c., in all of which they are collected into more or less compact spherical heads. Each is an ovate or angular, pellucid, greenish granule or vesicle.

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Frequently, on their falling away from the leaves, as in *J. exilis* (Suppl. tab. 2) and some others, the leaves appear injured and jagged, as if the cellules had been torn off; and it is not improbable but that, in certain states of the plant, this may really be the case, so that each of these particles may be looked upon as a cellule. Their color, when first formed, too, is generally green, turning to brown in an older state, as in *J. nemorosus*, and to a fine red in *J. erecta*.

SECTION III.

On Jungermannia as a Genus, and on the Arrangement of the British Species.

As far as my experience enables me to offer an opinion, from my acquaintance with the British and many foreign species, the plants that at present form the genus *JUNGERMANNIA*, however numerous, cannot be divided into other genera by means of characters taken merely from the fructification. In this respect, those which seem most allied in habit, often differ essentially, so that, with regard to the *Jungermannia frondosa*, for example, which at first sight appear to demand a separation, unless there are made almost as many genera as species, I do not know any character which they have in common, by which they might be discriminated from the *Jungermannia foliosa*.

Jungermannia nemorosus, *repens*, *umbrosa*, and *undulata*, have a peculiar habit about them, and have, moreover, a remarkably compressed calyx, truncate at the mouth, and we may think here to have discovered a character by means of which they may be removed from the rest of the genus; but an examination of other species will convince us of the inadequacy of this character, since *J. asplenoides* and *J. complanata*, two plants very different in other respects, have a calyx of the same shape.

A still stronger peculiarity of habit seems to unite *J. aspidiifolia*, *J. humilifolia*, *J. calyptrifolia*, and *J. minutissima*, in which also the singular structure of the capsule, and especially its short valves, seems to claim for them the privilege of being considered a distinct genus; yet there are two species, *J. Mackenzii* and *J. platyphylla*, which connect them by an easy gradation with *J. dilatata* and *J. Tamarisci*.

The following character of the genus I would propose as liable to fewer objections than any that has yet been given.

CLASS AND ORDER.

CRYPTOGAMIA, HEPATICÆ. Schreb.

(NATURAL ORDER.)

HEPATICÆ. Jun. De Cand. PLANTÆ CRYPTOGAMÆ, CALYPTRATÆ, DIOSPYRACOLATÆ. Moench.

GENERIC CHARACTER.

Receptaculum seminis commune nullum.

Cal. Perichætum monophyllum tubulosum, raris nullum.

INTRODUCTION.

Calyptre gemmæ tegens, apice ad capsulam emittendam verticalitèr rumpens, styligera.
Capsula pedunculata, ovata vel spherica, in valvas quatuor, pides minores longas,
longitudinalitèr fissæ, rarissimè enormitèr disruptæ.
Columella nulla.
Seminis filis spirælibus elasticis implata.

CHAR. ESSENTIALES. *Receptaculum* fructûs commune nullum. *Perianthium* monophyllum,
tubulosum. *Capsula* pedunculo calyce longiori insidens, quadrivalvis.

This distinguishes it at once from *Marchantis*, by the absence of the common receptacle for the fructification from *Anticeros*, by the four-valved capsule, and the want of a columella from *Targuium*, by the monophyllous calyx and from *Razziæ* and *Sphaerocarpus*, by the long footstalks of the capsules. Indeed, were it not for the anomalous capsule of *J. pusilla*, the Linnæan character, "*capsula quadrivalvis*," would, I think, be admirably characteristic of the whole genus.

I shall now offer an Analytical Table of the species described in the present work, arranged, in some degree, according to a method employed by Lamarck and De Candoille in their *Flore Française*, with alterations principally suggested by my valued friend, Mr Lyell; and I shall then proceed to give full and amended characters of them, with additional notes and synonyms, which will conclude this Introduction, already, perhaps, carried to too great a length.

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JUNGERMANNIARUM BRITANNICARUM

CLAVIS ANALYTICA.

JUNGERMANNIÆ,

- A. { FRONDOSÆ 1.
FOLIOSÆ B.

(FRONDOSÆ.)

1. Nerro præditum 2.
Nerro obsoletum 7.

(Nerro præditum.)

2. Frondibus pubescentibus *J. pubescens.*
Frondibus læribus 3.
Calyptrâ inferiore*, hispida *J. furcata.*
Calyptrâ superiore, lavi 4.
Calyce duplice 5.
Calyce simplice 6.
Calyptrâ calycem anteriorem exsertente *J. Lyellii.*
Calyptrâ calycem anteriorem multo breviora *J. Hiernica.*
Frondis marginem subintegrum *J. cypripella.*
Frondis marginem insigniter lobato *J. blanda.*

(Nerro obsoletum.)

7. Fronde valde ramosâ, compressâ, calyptrâ tuberculatâ *J. multifida.*
Fronde simpliciusculâ, subita tenuiâ, calyptrâ glabrâ *J. pinguis.*

* By calyptra inferior, I mean that it originates on the underside of the stem, as calyptra superior does on the upper.

(FOLIOSÆ.)

B.	{ Exstipulatæ	C.
	{ Stipulatæ	H.

C.	{ Foliis multifariis insertis	I.
	{ Foliis bifariis *	D.

1. Folia quadrifaria 2.
 2. Folia abque ordine unico disposita 4.

(Folia quadrifaria.)

3. Calycis foliis perichastalibus immanens *J. juniperina.*
 4. Calycis exsertis 3.
 5. Calycis ovato, ore contracto (foliis teneris) *J. laxifolia.*
 6. Calycis oblongo, ore aperto (foliis rigidis) *J. julacea.*

(Folia abque ordine disposita.)

7. Folia subovata, calycis nulla *J. Hookeri.*
 8. Folia setacea 3.
 9. Folia fasciculatis, calycis dentato *J. trichophylla.*
 10. Folia bi-tri-nis, calycis alfiatis *J. rotunda.*

(Folia bifaria.)

D.	{ Foliis indivisis	I.
	{ Foliis divisis	E.

(Folia indivisa.)

1. Folia serrato-dentata 2.
 2. Folia integerrima 4.
 3. Folia rotundatis *J. asplenoides.*
 4. Folia pili minime ovatis 3.
 5. Folia obovatis, omnibus spinuloso-dentatis *J. spinulosa.*
 6. Folia ovatis, his illic integerrimis *J. decipiens.*
 7. Folia rotundatis 5.
 8. Folia pili minime ovatis 11.

* By this I mean, that the leaves are inserted on two opposite sides of the stem, whatever their direction may be.

CLAVIS ANALYTICA.

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5.	Calyce laterali (inferiore)	<i>J. Sphegali*</i>
	Calyce terminali	6.
	Calyce compresso, angulato	7.
6.	Calyce terete	9.
	Calyce foliis perichæthallibus immixto	<i>J. crispimanus*</i>
7.	Calyce exserto	8.
	Calyce superne quadrangulato, foliis undulatis, immarginatis	<i>J. Ayallæ.</i>
8.	Calyce per totam longitudinem quadrangulato, foliis oncostriatis, mar- ginalis	<i>J. crenulata.</i>
	Calyce apice depresso	<i>J. lanceolata.</i>
9.	Calyce plus minuse acuminato	10.
	Calyce ore dentato	<i>J. pusilla.</i>
10.	Calyce ore quadrifido	<i>J. raphanocarpa.</i>
	Folii amplexicaulibus	<i>J. cordifolia.</i>
11.	Folii falcatis, libris	<i>J. Donatiana.</i>

(*Exstip. fol. def. distinct.*)

E.	{ Foliorum segmentis pluribus quàm duobus	1.
	{ Foliorum segmentis duobus	4.

(*Foliorum segmentis pluribus quàm duobus.*)

1.	Folia quadripartita	<i>J. retiformis.</i>
	Folia trifida	2.
	Calyce campanulato	<i>J. pusilla †.</i>
2.	Calyce oblongo-ovato	3.
	Foliorum segmentis (nunc 2.) integris	<i>J. repulata †.</i>
3.	Foliorum segmentis denticulatis	<i>J. incisa.</i>

(*Foliorum segmentis duobus.*)

4.	Foliorum segmentis equalibus (<i>explanatis</i>)	5.
	Foliorum segmentis inequalibus (<i>conduplicatis</i>)	6.

(*Foliorum segm. 2. equalibus, explanatis.*)

5.	Foliorum marginibus revolutis	<i>J. Orcadea.</i>
	Foliorum marginibus non revolutis	6.

* *J. Sphegali* and *J. compressa*, if the young shoots alone are examined, will be seen to possess small stipules, but, as I never could find them on the older stems, I have thought it best to place them in the division *Exstipulata*.

† This species has the leaves very indistinctly divided; yet, I think, it cannot enter into any other family than the present.

‡ *J. repulata* has the leaves sometimes, though rarely, bifid, and it might be looked for in the following tribe.

6.	Caulis erecto	7.
6.	Caulis procumbente	8.
7.	Calyx foliis perichlamideis immixto (fol. subpatentibus)	<i>J. marginata.</i>
7.	Calyx nullo (fol. erecto imbricatis)	<i>J. coarctata.</i>
8.	Caulis simpliciter vel simpliciter ramoso	9.
8.	Caulis vel surculis subterminalibus ramoso	11.
9.	Foliorum segmentis obtusis, calyx pyriformi	<i>J. hystrix.</i>
9.	Foliorum segmentis acutis, calyx ovato vel oblongo	10.
10.	Folius emarginatus, sive obtuso	<i>J. ventricosa.</i>
10.	Folius emarginatus, sive obtusiusculus	<i>J. arcea.</i>
11.	Folius serratis	<i>J. Turneri.</i>
11.	Folius integerrimis	12.
12.	Foliorum segmentis rectis	13.
12.	Foliorum segmentis curvatis	14.
13.	Calyx terminali	<i>J. byssacea.</i>
13.	Calyx subterminali	<i>J. bicarpedata.</i>
14.	Foliorum segmentis brevibus, coarctatis	<i>J. connatis.</i>
14.	Foliorum segmentis longis, incurvatis	<i>J. curvifolia.</i>

(Foliorum segm. 2. inaequal. condupl.)

P	{ Segmentis inferioribus minoribus	1
	{ Segmentis superioribus minoribus	G.

1.	Segmentis inferioribus inflatis	<i>J. cochleariformis.</i>
1.	Segmentis inferioribus planis appressis	<i>J. complanata.</i>

(Segmentis inferioribus majoribus.)

G.	{ Calyx compresso	1
	{ Calyx terete	5.

1.	Folius dentatus	3.
1.	Folius integerrimis	4.
2.	Foliorum lobis ad basin usque partitis	<i>J. planifolia.</i>
2.	Foliorum lobis evidenter unguis	5.
3.	Foliorum lobis obovatis, ciliatisq. dentatis	<i>J. nemoralis.</i>
3.	Foliorum lobis ovatis, acutis, serratis	<i>J. umbrosa.</i>
4.	Caulis erecto, foliorum lobis inferioribus multo minoribus	<i>J. undulata.</i>
4.	Caulis procumbente, foliorum lobis aequilibus	<i>J. cuspidata.</i>

(Calyx terete.)

5.	Foliorum lobis recte conduplicatis	6.
5.	Foliorum lobis lateraliter incurvis	6.

CLAVIS ANALYTICA.

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6. Folia nervosa *J. albicans.*
 7. Folia coriacea 7.
 8. Folia ovata *J. obtusifolia.*
 9. Folia ovata *J. Dicksoni.*
 10. Folia ovata *J. minuta.*
 11. Folia ovata *J. erecta.*

(Stipulatae.)

- H. { Folia indivisa 1.
 { Folia divisa 1.

1. Stipula integra 2.
 2. Stipula pila imbricata laciniata, emarginata vel bifida 3.
 3. Calycis folia perichlamideis numero *J. scalaris.*
 4. Calycis exserti 3.
 5. Calycis inferius, dissidui, folia subquadrata *J. polyantha.*
 6. Calycis terminali, terete, folia rotundata vel ovata 4.
 7. Folia omnibus rotundata *J. Taylori.*
 8. Folia hic illic ovata *J. anomala.*
 9. Folia cuneiformibus (stipulae lychnis) *J. cuneifolia.*
 10. Folia pila imbricata ovata (stipulae lanceolata vel emarginata) 5.
 11. Folia omnibus integra, stipulae laciniata (cellulae talis) *J. reticulata.*
 12. Folia, hic illic, stipulae emarginata (cellulae majuscula) *J. Trichomanis.*

(Folia divisa.)

- I. { Segmentis equalibus 1.
 { Segmentis unequalibus K.

(Segmentis equalibus.)

1. Folia bifida 2.
 2. Folia trifida 3.
 3. Stipula integra 3.
 4. Stipula bifida 4.
 5. Stipula integerrima, folia valde concava, segmentis obtusis *J. attenuata.*
 6. Stipula densata, folia planiuscula, segmentis acutis *J. stipulacea.*
 7. Stipularum segmentis integerrimis, calyce terete *J. Francisii.*
 8. Stipularum segmentis laciniatis, calyce triangulari 5.
 9. Folia omnibus acutis bidentatis *J. ludoviciana.*
 10. Folia plerumque obtusis bidentatis integerrime *J. heterophylla.*

* See note under *J. Sparganii* and *J. composita*, in the Division *Exaristatae*.

† *J. minutissima*, according to many of its leaves, might be supposed to belong to this division, but I have placed it in the *Jung. stip. fol. div. acut. marginal. inf. imbricata*, for reasons there given.

CLAVIS ANALYTICA.

(Folium trifidum.)

6. Folia apicē concavimaculis, fructu terminali *J. barbata.*
 6. Folia apicē convexa, fructu laterali 7
 7. Folia subquadralia acutē tri-quadrifolia *J. septentr.*
 7. Folia ovatis, obtusē bi-tri-dentatis *J. trilobata.*

(Foliorum segmentis inaequalibus.)

- K. { Foliorum lobis inferioribus superioribus appressis 1.
 { Foliorum lobis inferioribus involutis 8.

1. Foliorum lobis inferioribus inflatis 2.
 1. Foliorum lobis inferioribus planiusculis 4.

(Segmentis inferioribus inflatis.)

2. Folia spinuloso-dentata *J. Hutchinsiae.*
 2. Folia integerrimis 3.
 2. Stipularum margines plano *J. dilatata.*
 2. Stipularum margines recurvo *J. Tenorei.*

(Segmentis inferioribus planiusculis.)

4. Foliorum lobis multissimè divinis 6.
 4. Foliorum lobis integris 7.
 6. Folia plana *J. tomentella.*
 6. Folia apicē valdè convexa 6.
 6. Foliorum lobis stipularumque apiculato-dentatis *J. Woodii.*
 6. Foliorum lobis stipularumque ciliatis *J. ciliatis.*
 7. Stipularum segmentis integerrimis *J. platyphylla.*
 7. Stipularum segmentis spinuloso-dentatis *J. levigata.*

(Segmentis inferioribus involutis.)

8. Stipula integerrima *J. Hookeri.*
 8. Stipula acutè emarginata 9.
 9. Folia rotundata 10.
 9. Folia ovatis, acutis 11.
 10. Folia conveximaculis *J. serpyllifolia.*
 10. Folia hemisphaericis *J. adumbrata.**
 11. Folia convexa *J. humulifolia.*
 11. Folia calyptriformibus *J. calyptrifolia.*

* *J. micrantha* is, perhaps, an exception to this character, yet there is often a minute lobe, which, if not sensibly involute, is certainly not appressed to the larger one, and the affinity of the species has been a further inducement with me to place it here.

JUNGERMANNIARUM BRITANNICARUM

SYNOPSIS.

A. FOLIOSÆ.

† STIPULÆ NULLÆ *.

a. Folius multifarium insertus.

1. *J. trichophylla*, caule repente, vagè ramoso: foliis undique imbricatis, hic illis fasciculatis, setacea, articulatis, patentibus, rectis fructu terminali, calycibus oblongis, ore contracto, ciliato. (Tab. VII.)

J. trichophylla. Walt. Lapp. p. 385. Moench, Fl. Crypt. Germ. p. 421.

This species is not uncommon in alpine countries, creeping over decaying leaves and Mosses. Mr. Turner has received specimens from Kamichatka, which were gathered by Dr. Tilesius. Wahlberg says that it is common throughout all Lapland, not only in the forests, but upon the loftiest alps; but he and Moench appear to me to have fallen into an error in attributing to it stipules. "Stipulae," the former observes, "ad latus inferioris circuli adnatae, foliis paulo breviores et minus patentes, de cetero his similes." Lapp. p. 385.

2. *J. setacea*, caule repente, subpinissimè ramoso: foliis undique imbricatis, hinc, setacea, articulatis, patentibus, incurvis fructu repis propriis brevibus terminali, calycibus oblongis, ore aperto, ciliato. (Tab. VIII. and Suppl. Tab. I.)

J. setacea. Engl. Bot. t. 9482.

* In this division I have brought *J. Spizars* and *J. compressa*, upon which stipules are found only on the young shoots.

Dr. Taylor took this species in Ireland with calyxes, of which the perichetial leaves vary somewhat from our figure, (tab. vi. 1.) and I have consequently figured them in the supplementary plate, where it will be seen that they are divided into three or four large and broad, unequal, slightly toothed segments. Dr. Mohr has the subjoined observation in his *Fl. Crypt. Germ.*, immediately following his division of *Hypnum*, "*folia dextrorsumque vergentibus, brevibus & subseriatis.*" p. 349. "*Hujus subdivisionis videtur, Junc. setosus, Web. Spic., ex spina herb. fractis vixi cernere. Folia non gemina, quasi anther habet, sed laxis disposita, subpatula, subulata, cernia emans vix, integrissima. Juncusmanis nullis modo est. Vix unquam teneriores speciem vidimus.*" Weber's words are certainly at variance with this description, and are such as I think no one would hesitate in applying to our *Juncusmanis*. "*Perichetia sunt truncata, repentes, seminales, truncata, laxis interdum longioribus, ex alba virescentes. Folia alterna, gemina, setacea, brevissima, non nisi lentis accurate perspicienda.*" Web. Spic. p. 186.

- 2 *J. juncea*, caule erecto, vix ramoso, filiformi foliis quadrifariis, ovatis, acutis imbricatis, erectis, acutis bifidis, segmentis lanceolatis, acuminatis, subseriatis, perichetialibus quadripartitis fructu terminali, calycibus oblongis, superis plicatis, ore apertis, dentatis. (Tab. II.)

J. constricta. WALT. Lepp. p. 384. (arch. sp. LANTROSTII.)

From the description, no less than from the reference to the figure of *J. juncea*, in English Botany, there is no doubt but Dr. Wahlberg has quite mistaken the *J. constricta* of Lichstein, calling it *J. juncea*, and vice versa the true *J. juncea*. *J. constricta* had why he has arranged our plant among the stipulated *Juncusmanis* I cannot conceive. Indeed, in order to do this, he has been under the necessity of forming a division, which he defines, "*Stipula magnitudine et figura ferè foliorum*" "One criterion, besides our *J. juncea*, *J. setiformis* and *J. trichophylla*, on none of which have I ever seen any thing which can be looked upon as stipules. Even in the arctic regions, the species is confined to the highest mountains." "*Habitus*," says Wahlberg, "*in inter media lina (rigida) junia nitem perennem artemisiam alpinam passim.*"

- 4 *J. lasiocoma*, caule erecto, simplicivulso, filiformi foliis divaricatis, quadrifariis, erecto-patentibus, ovatis, subseriatis, acutis bifidis, (perichetialibus similibus) fructu terminali, calycibus oblongis, subplicatis, ore contracto, dentatis. (Tab. I. 2.)
- 5 *J. juniperus* caule erecto, fruticoso, subsimplici foliis quadrifariis, filicatis-secundis, linearis-lanceolatis, bipartitis, segmentis rectis, acuminatis fructu terminali, calycibus ovatis, foliosis. (Tab. 19.)

I have gathered specimens of this species with male fructificationes, which is solitary. Perigonal leaves large, swollen at the base. Anthers spherical. (v. Suppl. Tab. 1.)

- 6 *J. Hookeri*, caule erecto, subramoso foliis unilque imbricatis, ovatis v. oblongo-ovatis, hic illic lobatis angulatisve fructu terminali, calyx nullus; calyptrae magis oblonga, cornea, lavi. (Tab. 117.)

b. *Folius biferius.*x *Folius indivisus.*

7. *J. asplenoides*, caule ascendente, ramoso foliis obovato-rotundatis, ciliato-dentatis, subrecurvis, fructu terminali, lateraliq[ue]; calycibus oblongis, compressis, obliquis, ore truncato, subciliato. (Tab. XIV.)

J. asplenoides. WALT. Lapp. p. 395. Monz. Fl. Crypt. Germ. p. 420.

The male fructification of this species I found in woods at Berry Pomeroy Castle, Devonshire, in great abundance in March and April.

8. *J. spinulosa*, caule erecto, ramoso foliis obovatis, recurvatis, basi margine apiceque dentato-spinulosis fructu laterali, axillariq[ue], calycibus subrotundis, compressis; ore truncato, ciliato. (Tab. XIV.)

In Devonshire, particularly in the mountainous parts, *J. spinulosa* is plentiful; but in the plains of England, I know of only one habitat, near Rafar stone in the New Forest, Hants, where it was gathered by Mr. Lyell. At Powerscourt waterfall, near Dublin, Dr Taylor finds it with calyx, but never with capsules; and Mr Lyell in the same state, on rocks above the summit of Stock-gill Foss, Cumberland.

Another var., which may be called γ *foliis minutis apice bidentatis*, has been found by Mr. Lyell, at Kenwick, and by the late Miss Hutchins and Mr. Mackay, in Ireland.

9. *J. decipiens*, caule erecto, flexuoso, subsimplici foliis inferioribus minoribus, ovatis, integerrimis, superioribus rotundato-ovatis seu subquadratis, dente uno alterave spatio, spiniformi. (Tab. L.)
10. *J. Donniana*, caule erecto, subsimplici, filiformi, flexuoso foliis arcte imbricatis, subherissantibus, oblongo-ovatis, concavis, apice bidentatis, falcato-secundis.— (Tab. XXXIX)
11. *J. pusilla*, caule ascendente, simpliciusculo foliis elliptico-ovatis fructu terminali; calycibus oblongo-ovatis, acuminatis; ore contracto, denticulato. (Tab. XLII.)

Mr. Lyell finds this at Kinnordy, Kermuir, Scotland; producing calyx in August.

12. *J. lanceolata*, caule procumbente, subsimplici foliis patentibus, ovato-subrotundis fructu terminali, calycibus oblongis, cyathaceis; apice depresso, plano, ore contracto, inciso-dentato. (Tab. XLIII.)
13. *J. cordifolia*, caule erecto, flexuoso, dichotomo foliis erectis, concavis, cordatis, circumvolutis fructu terminali axillariq[ue], calycibus oblongo-ovatis, subplicatis, ore minuto, denticulato. (Tab. XLIII.)

14. *J. Sphagni*, caule procumbente, simpliciusculo, (elongationibus gemmiferis solummodo stipulatis!); foliis orbicularibus fructu in ramis propriis terminali, calycibus oblongis, utrinque attenuatis ore contracto, denticulatis. (TAB. XXXIII and Suppl. TAB. 12.)

J. Sphagni. WALT. Lapp. p. 354. MONN. Fl. Crypt. Germ. p. 420.

Mr. LYELL found gemmæ in August at Stock-gill Force, near Ambleside, and I met with them abundantly in April, on mountains bordering on Dartmoor, Devonshire. The fructification I have been obliged to figure in the Supplement, where, at tab. 11. fig. 1 is a gemmiferous plant, magn. 6; f. 2, extremity of the same, magn. 4 f. 3, gemmæ, magn. 2; f. 4, the same, magn. 1; f. 5, portion of a stem with the female fructification, magn. 6, f. 6, proper stalk to the fructification, with the perichætal leaves and calyx, magn. 4; f. 7, outer perichætal leaf, f. f. 8, 9, inner ditto, magn. 3; f. 10, a spiral filament, and f. 11, the seeds, both magn. 1.

Wahlenberg quotes, under *J. Sphagni*, the *J. sceleris* of Scheidel's Diss. Jung., in which he is probably correct; for the gemmæ of that figure correspond sufficiently well with our plant. The Swedish author, however, appears to me to have confounded with this the *J. Topleri* of this work, with which a part of his description aptly agrees, "*valde molle vel spongiosa, et reticulo laxiore facta*," which is by no means the case with *J. Sphagni*.

15. *J. crenulata*, caule procumbente, ramoso foliis rotundatis, marginatis fructu terminali, calycibus obovatis, compressis, longitudinaliter quadrangularibus, ore contracto, dentatis. (TAB. XXXVII.)

This is plentiful on Burgh Common, near Yarmouth, and Mr. Lyell finds a small but elegant state of the plant at Kinnordy, bearing calyces in August. The male fructification resembles that of *J. rosæris*. It is figured in Suppl. tab. 2.

16. *J. sphaerocarpa*, caule ascendente, simplicio foliis orbiculatis fructu terminali, calycibus oblongo-ovatis, cylindraceis, quadrifidis (capsulâ sphericâ). (TAB. LXXIV.)

17. *J. hyalina*, caule ascendente, flexuoso, dichotomo foliis rotundatis, subundulatis fructu terminali, calycibus ovatis, sagulatis, ore contracto, quadridentato. (TAB. LXXV.)

18. *J. compressa*, caule erecto, diviso foliis orbicularibus, summis reniformibus, appressis, (stipulis in innovationibus solummodò) fructu terminali, calycibus foliis numeris, oblongis, carnosis, ore aperto, quadridentatis. (TAB. LVI.)

Plentiful in Switzerland, particularly in the valley of Goussier, near the Grindel.

x x *Folius emarginatus vel bifidus, segmentis equalibus.*

19. *J. emarginata*, caule erecto ramoso foliis laxè imbricatis, patentibus, obcordatis, emarginatis fructu terminali, calycibus ovatis, dentatis, foliis numeris. (TAB. XXVII.)

J. emarginata. WALT. Lapp. p. 392. MONN. Crypt. Germ. p. 421

20. *J. concinnata*, caule erecto, ramoso foliis arctissime imbricatis, erectis, concavis, ovatis, obtusis, emarginatis fructu terminali, calycibus nullis. (Tab. III.)

J. fulvesc. WALT. Lapp. p. 392. MONN. Crypt. Germ. p. 421.

21. *J. orridensis*, caule erecto, simplici foliis arcte imbricatis, erectis v. patentibus, coedato-ovatis, marginibus recurvis. (Tab. LXXI.)

This I have found abundantly in Switzerland, but always barren.

22. *J. infusa*, caule procumbente, simplici vel ramoso foliis subrotundis, concavis, acutè bifidis segmentis rectis, obtusis fructu terminali, calycibus pyriformibus, ore contracto, dentato. (Tab. XXXVII.)

J. infusa. WALT. Lapp. p. 393.

Abundant in fruit about Torquay, and Dartmouth, Devonshire, in the month of April.

23. *J. exilis*, caule prostrato, simplicivulso foliis patentibus, subquadratis, profundè emarginatis fructu terminali, calycibus oblongis, ore plicato, dentato. (Tab. IX.)

J. exilis. Engl. Bot. t. 9496.

J. Funckii. MONN. Crypt. Germ. p. 492. WALT. Lapp. p. 393. SCHWABER. Prodr. Musc. Hep. p. 37. non Ic.

Mr Francis finds this plant, in December, with gemmas of a brownish color, angular, scattered in small loose clusters at the edges of the leaves, and likewise with calyces shorter and broader than in the specimen figured at Tab. IX., and I have consequently thought them deserving of a place in a supplementary plate. (See Suppl. t. II., where at f. 1, is a gemmiferous plant, magn. 6, f. 2, two leaves of the same, showing the cross margin of the leaves, whence the gemmae have fallen, magn. 6, f. 3, particles of gemmae, magn. 1, f. f. 4, 5, calycine plants, magn. 6, in which the calyces are shorter than is usual in this species, f. 6, leaf of the same, magn. 4.)

24. *J. ventricosa*, caule prostrato, subramoso foliis patentibus, subquadratis, obtusè emarginatis, lateribus incurvis fructu terminali, calycibus oblongis, ore contracto, plicato, dentato. (Tab. XXVIII.)

J. ventricosa. Engl. Bot. t. 2669.

25. *J. Turneri*, caule procumbente, flexuoso, setellulim ramoso foliis latè ovatis, acutè bipartitis, segmentis subconduplicatis, spinuloso-dentatis fructu terminali, calycibus linear-oblongis, longitudinalitè plicatis, ore quoque plicato. (Tab. XXX.)

26. *J. decurpadata*, caule procumbente, stollatum ramoso foliis subquadratis, acutè bifidis, segmentis acutis, rectis, integerrimis fructu terminali, calycibus oblongis, plicatis, ore dentato. (Tab. XI.)

J. decurpadata. MONN. Crypt. Germ. p. 494. WALT. Lapp. p. 394.

The anthers of this species I have figured in the Suppl. tab. xv.: they are axillary, two or three together in a swollen perigonial leaf, and spherical. Style short, white.

27. *J. hyssopus*, caule procumbente, stellatum ramoso foliis subquadratis, obtusè bifidis, segmentis acutis fructu terminali, calycibus oblongis, plicatis, ore dentato. (Tab. xii.)

J. hirsutidula, var. *β*. WAND. Lapp. p. 324.

Both Mahr and Wahlberg consider this as merely a variety of *J. hirsutidula*, in which opinion they may possibly be correct; though the calculation is strikingly different, which did not escape the observation of the last-mentioned author.

28. *J. cuneatus*, sarculo procumbente, stellatum ramoso foliis orbicularibus, concavis, apice lunulari-emarginatis fructu in ramis propriis, brevissimis, centralibus terminali; calycibus oblongo-ovatis, ore ciliato. (Tab. xv.)

J. cuneatus. WAND. Fl. Lapp. p. 323.

29. *J. curvifolia*, sarculo procumbente, stellatum ramoso foliis subrotundis, valde concavis, bifidis, segmentis acuminatis, incurvatis fructu in ramis propriis, brevissimis, centralibus terminali, calycibus oblongis, subplicatis, ore dentato. (Tab. xvi.)

J. curvifolia. MONS. Crypt. Germ. p. 433.

J. hirsutifolia. SCHUMMER. Catal. 3. n. 59.

Having, since the publication of tab. xvi., received more perfect copies of this species from Ireland, I have figured one in the first supplementary plate, where it will be seen that the perichlamal leaves are serrated.

x x x *Folius tri-quadrifidus, segmentis equalibus.*

30. *J. capitata*, caule prostrato, simplicinaculo foliis rotundato-quadratis, inferioribus bifidis, reliquis tri-quadrifidis fructu terminali calycibus oblongo-ovatis, subplicatis, ore contracto, dentato. (Tab. lxxx.)

31. *J. incisa*, caule prostrato, depresso, simplicinaculo foliis subquadratis, undulatis, subtrifidis, segmentis inaequalibus, hic illic denticulatis fructu terminali, calycibus obovatis. (Tab. x.)

32. *J. pusilla*, caule procumbente, subsimplici foliis horizontalibus, quadratis, undulatis, obtusè bi-tri-crenatis fructu terminali, calycibus campanulatis. (Tab. lxxix.)

J. pusilla. MONS. Crypt. Germ. p. 440.

33. *J. setiformis*, caule erecto, subsimplici foliis bifidis, acutè umbelatis, erectis, quadratis, quadrifidis, angulis inferioribus margine hinc illic spinuloso-dentatis fructu fructu terminali lateralique, calycibus oblongis, placentis, ore aperta. (TAB. XL.)

J. setiformis. Moench, *Crypt. Germ.* p. 415. Wahlenb. *Lapp.* p. 335.

This plant seems peculiar to northern latitudes. It has never been found in the Alps, or any part of the south of Europe; nor, in the British dominions, any where but in Scotland. I have seen specimens from Kamtschatka, and Wahlenberg says, "In saxia siccis Lapponiae foliis tam sylvaticis ac alpinis ubique" but this author never appears to have met with the fructification. Muhr says of it, "Fructificatio speciei nulli quæquam botanicorum usque nunc observata, angula adest in exemplo *J. remot.* Thunbergianum."

x x x x *Folius bifidus, segmentis inæqualibus, conduplicatis.*

34. *J. nemorosa*, caule erecto, subdichotomo foliis inæqualitèr bilobis, serrulatis, dentato-ciliatis, lobis conduplicatis, inferioribus majoribus, obovatis, superioribus subcordatis, obtusis fructu terminali, calycibus oblongis, incurvatis, compressis, ore truncato, dentato-ciliato. (TAB. XXI.)

J. nemorosa. Moench, *Crypt. Germ.* p. 427.

35. *J. planifolia*, caule erecto, subsimplici foliis inæqualitèr bilobis, ad basin usque bipartitis, dentato-ciliatis, lobis conduplicatis, inferioribus majoribus, ovatis, superioribus cordatis, obtusis. (TAB. LXVII.)

Specimens of this plant, which I have lately had the opportunity of examining, have satisfied me that it ought to enter into this Division; and, indeed, the difference between it and *J. nemorosa* is so slight, that I am almost inclined to consider it a variety, though a very remarkable one, of that species.

36. *J. umbrosa*, caule erectiusculo, subramoso foliis inæqualitèr bilobis, lobis conduplicatis, apice serratis, acutis, inferioribus majoribus ovatis, superioribus rotundato-ovatis fructu terminali, calycibus oblongis, incurvatis, compressis, ore truncato, integerrimo. (TAB. XXIV.)

Dr. Muhr considers this species as a variety of *J. repens*, but to me it appears much more allied to *J. nemorosa*, from which it is scarcely to be distinguished, but by its smaller size and serrated, not dentato-ciliate, leaves. GERMES are not rare on this species in the summer months. They are of an ovate and somewhat angular figure, collected into an oblong brown mass, at the ends of the terminal leaves. (See Suppl. TAB. XII.)

37. *J. undulata*, caule erecto, subdichotomo foliis inæqualitèr bilobis, undulatis, integerrimis, lobis sub-rotundatis, conduplicatis, inferioribus majoribus fructu terminali, calycibus oblongis, incurvatis, compressis; ore truncato, integerrimo. (TAB. XXII.)

J. undulata. Moench, *Crypt. Germ.* p. 428. Wahlenb. *Lapp.* p. 351.

38. *J. repensata*, caule procumbente, simpliciusculo foliis rotundatis, subaequalitèr bilobis, integerrimis, lobis conduplicatis, fructu terminali calycibus oblongis, incurvatis, compressis, ore truncato, denticulato. (TAB. XXIII.)

J. repensata. MORA, Crypt. Germ. p. 427. WARE, Lepp. p. 591.

J. compacta. ROY, Fl. Germ. p. 603.

The last synonym I am enabled to subjoin through the kindness of my friend, Dr. Swartz, who sent me authentic specimens received by him from Germany. It is, perhaps, not an uncommon species in this country, Mr. Lyell having found it both in Sussex and in the north of Scotland.

39. *J. albicans*, caule erecto, subultrio foliis inaequalitèr bilobis, lobis conduplicatis, medio pellucidis, apice serratis, inferioribus majoribus, subcineriformibus, superioribus oblongo-ovatis, acutis fructu terminali, calycibus obovatis, cylindricis, ore contracto, dentato. (TAB. XXV.)

J. albicans. MORA, Crypt. Germ. p. 428.

40. *J. obtusifolia*, caule ascendente, simplice foliis inaequalitèr bilobis lobis conduplicatis, obtusis, integerrimis, inferioribus majoribus, subcineriformibus, superioribus ovatis fructu terminali, calycibus obovatis, ore contracto, dentato. (TAB. XXVI.)

41. *J. Dicksoni*, caule ascendente, subimbrice foliis inaequalitèr bilobis, lobis conduplicatis, inferioribus majoribus, utrinque angustè ovatis, subintegerrimis, acutis fructu terminali, calycibus ovatis, plicatis, ore contracto, dentato. (TAB. XXVII.)

J. taxifolia. WARE, Lepp. p. 390. tab. xxv. f. 2. n. c?

I quote this synonym with a note of doubt, solely because the author says, "folia obtusiuscula," which is not the case in *J. Dicksoni*.

42. *J. minuta*, caule erecto, subdichotomo foliis horizontalitèr patentibus, subconduplicatis, superioribus aequalitèr, inferioribus inaequalitèr bilobis, omnibus acutiusculis fructu terminali, calycibus obovatis, apice parùm plicatis: ore contracto, denticulato. (TAB. XXIV.)

J. minuta. WARE, Lepp. p. 393.

J. decursiva. MORA, Crypt. Germ. p. 433.

43. *J. erecta*, caule prostrato, simpliciusculo foliis inaequalitèr bilobis, lobis subconduplicatis, inferioribus majoribus, ovatis, acutis, concavis, apice usquè bidentatis, superioribus minutis, denti-formibus. (TAB. XXII.)

J. erecta. MORA, Crypt. Germ. p. 430.

Mr. Lyell has gathered, in the New Forest, Hants, individuals of this plant with young and very imperfectly formed calyces. They are terminal, or, from the shooting forth of an innovation, lateral, obovate, with the unexpanded mouth lateral and toothed. The peri-

chaffal leaves are large, at the extremity trifid and quadrifid, having the segments jagged or lacinate. (See Suppl. tab. 1. f. 1, *J. erecta*, magn. 6; f. 2, young calyx and perichætiol leaves, magn. 4; f. 3, calyx removed, magn. 3; f. 4, perichætiol leaf, magn. 3.)

44. *J. cochleariformis*, caule procumbente, subsimplici foliis superius imbricatis, inæqualiter bilobis, conduplicatis, lobis superioribus majoribus, convexis, apice bifidis serratisque, inferioribus succatis. (TAB. LXVIII.)

In the north and north-western parts of Ireland, I have gathered it even more abundantly than in Scotland, but always without fructification.

45. *J. complanata*, surculo repente, vagis ramoso foliis distichis, superius imbricatis, inæqualiter bilobis, lobis superioribus majoribus, orbiculatis, inferioribus ovatis, appressis, planis fructu terminali, calycibus oblongis, compressis, truncatis. (TAB. LXXXI.)

†† STIPULATÆ.

a Folis integris v. rarius hic illic emarginatis,

46. *J. onostola*, caule procumbente, simplici foliis orbicularibus, his rotundato-ovatis, illis ovato-acuminatis, stipulis latè subulatis. (TAB. XXIV.)

47. *J. Taylori*, caule erecto, subsimplici foliis omnibus rotundatis, stipulis latè subulatis fructu terminali, calycibus ovatis, apice compressis, truncatis, bilabiatis. (TAB. LV 1.)

48. *J. scalaris*, caule repente, simplici foliis rotundatis, concavis, integris emarginatisque, stipulis latè subulatis fructu terminali, calyce foliis lacerato. (TAB. LXX.)

J. scalaris, Moench, Crypt. Germ. p. 419.

Moench is quite mistaken in supposing our *J. pendula* to be the same as *J. scalaris*. Their calyxes are totally different.

49. *J. polyanthos*, caule procumbente, subramoso foliis horizontalibus, rotundato-quadratis, planis, integris emarginatisque, stipulis oblongis, bifidis fructu in ramis propriis ex parte caulis inferioris egredientibus, laterali, calycibus calyptrâ dimidio brevioribus, bilabiatis, laciniatis. (TAB. LXXI.)

J. polyanthos, Moench, Crypt. Germ. p. 418.

50. *J. cuspidata*, caule repente, simplici foliis remotiusculis, cuneiformibus, integerrimis, vel apice obtusiusculè emarginatis, stipulis minutis, ovatis, bifidis. (TAB. LXXV.)

51. *J. ruscifolia*, caule procumbente, ramoso foliis horizontalibus, planis, ovatis, integris, stipulis latè ovatis, dentato-hispidis fructu laterali, calycibus subterraneis, oblongis, carnis, ore squamis foliaceis fimbriatis. (TAB. XL.)

J. villosa. Moen, Crypt. Germ. p. 417?

The imperfect description that Mehr has given of this species will not allow me to quote him with certainty under our plant.

52. *J. Trichomanis*, caule repente, subsimplici foliis horizontalibus, convexis, ovatis, integris, emarginatisque, stipulis rotundatis, humiliter-emarginatis fructu laterali, calycibus subterraneis, oblongis, carnosiss, brevibus; ore crenato. (TAB. XXXII.)

b Foliis bi- seu tri-fidis, segmentis aequalibus.

53. *J. bidentata*, caule procumbente, ramoso foliis latè ovatis, decurrentibus, apice bifidis, segmentis valdè acutis, integerrimis, stipulis bi-tri-fidis laciniatisque fructu terminali, calycibus oblongis, subtriangularibus, ore lacinato. (TAB. XXX.)

J. bidentata. Moen, Crypt. Germ. p. 408.

In the supplementary plate, tab. III., I have figured a variety of *J. bidentata*, as I have now reason to think it is, which is hinted at under the account of *J. stipulacea*, with the name of *J. Bauriacensis*. The leaves precisely accord with those of my var. β ., but the stipules are much less divided, and the capsule, which is short and broad, and scarcely at all triangular, rises from the bare stem, unprotected by any perichthial leaves. It was found by the late Miss Hutchins, near Bantry. (At f. 1, is a portion of the stem, with the calyx, magn. 6; f. 2, a portion of the stem, showing the stipules, magn. 6, and f. f. 3, 3, 3, stipules.)

54. *J. heterophylla*, caule repente, ramosa foliis rotundato-ovatis, decurrentibus, apice rarius acutis, plerumque obtusè emarginatis integerrime, stipulis bi-tri-fidis, his illis sublacinatis fructu terminali, calycibus ovatis, obtusè triangularibus, ore lacinato. (TAB. XXXI.)

J. heterophylla. Moen, Crypt. Germ. p. 407

55. *J. stipulacea*, caule procumbente, simplici foliis rotundatis, apice acutè emarginatis, segmentis acutis, rectis, stipulis magnis, ovatis, acuminatis, prope basin margine utraque uni-dentato fructu laterali, calycibus obovatis, apice subplicatis, ore contracto, obtusè dentato. (TAB. XII.)

56. *J. Francis*, caule erectiusculo, simplici vel ramoso foliis ovatis, convexis, acutè emarginatis, stipulis minutis, ovatis, bifidis fructu in ramis propriis terminali, calycibus oblongo-cylindraceis, parè plicatis, ore dentato. (TAB. XIII.)

37. *J. barbata*, caule procumbente, simpliciusculo foliis rotundato-quadratis, tri-quadrifidis, stipulis lanceolatis, acutè bifidis, margine laciniatis fructu terminali, calycibus ovatis, ore contracto, dentato. (Tab. LXX.)

38. *J. albescens*, caule repente, ramoso foliis valde concavis, propemodum hemisphaericis, emarginatis, stipulis ovato-lanceolatis, obtusis fructu in ramis brevibus terminali, calycibus oblongo-ovatis, ore dentato. (Tab. LXXII. and Suppl. Tab. iv.)

I am happy to be able to offer a figure of the fructification of this species in the supplementary plate above quoted. The calyces are oblongo-ovate, with a contracted mouth, and dentate; situated upon short, lateral branches, and surrounded at the base with perichetial leaves, which scarcely differ from the rest but in being larger. The capsule is ovate, splitting into four equal valves. Seeds and spiral filaments deep brown. The plant is extremely common on the more elevated Alps of Switzerland and I met with it, bearing capsules, as well upon the Grindel as upon the Susten, near the limits of perpetual snow. It is from the last-mentioned spot that the specimen here figured was gathered. (Fig. 1, *J. albescens*, magn. 6, f. 2, portion of the stem, showing the stipules, magn. 4, f. 3, seeds and spiral filaments, magn. 1.)

39. *J. reptans*, caule repente, stellatum ramoso foliis superius imbricatis, subquadratis, laciniis, acutè quadridentatis, stipulis lato-quadratis, quadridentatis fructu radicali, calycibus oblongis, plicatis, ore dentato. (Tab. LXXV.)

40. *J. trilobata*, caule repente, flexuoso, ramoso foliis superius imbricatis, ovatis, convexis, obtusè tridentatis, stipulis lato-subquadratis, crenatis fructu a parte caulis inferiore egrediente, calycibus oblongis, subacuminatis, ore lateralitè fissis.— (Tab. LXXVI.)

c. Folia bifidis; segmentis inæqualibus, conduplicatis.

x. Segmentis inferioribus, seu minoribus, planis.

41. *J. platyphylla*, caule procumbente, pinastem ramoso foliis inæqualitè bilobis, lobis superioribus rotundato-ovatis, subintegerrimis, inferioribus stipulisque ligulatis, integerrimis fructu laterali, calycibus ovatis, compressis, ore truncato, incisoberratis, hinc longitudinalitè fissis. (Tab. XL and Suppl. Tab. 212, where the roots are represented fastigate, as described at Tab. XL.)

J. platyphylla. Mous, Crypt. Germ. p. 397. Wanz. Lopp. p. 396.

42. *J. levigata*, caule procumbente, vagè bipinnatifida ramoso foliis inæqualitè bilobis, spinuloso-dentatis, lobis superioribus rotundato-ovatis, inferioribus ligulatis, stipulis oblongo-quadratis, spinuloso-dentatis. (Tab. LXXV.)

J. levigata. Mous, Crypt. Germ. p. 396.

63. *J. ciliaris*, caule procumbente, pinnatim ramoso foliis valdè convexis, inaequalitèr bilobis, lobis lobulisque ovatis, bipartitis, longè tenudèrque ciliatis, stipulis subquadratis, apice quadri-quinque-lobis, longissimè ciliatis fructu laterali, calycibus obovatis, ore contracto, dentato. (Tab. LXV.)
64. *J. Woodii*, caule procumbente, bi-tri-pinnato foliis valdè convexis, inaequalitèr bilobis, lobis superioribus bipartitis, spinuloso-dentatis, inferioribus minutissimis, oblongis, subintegerrimis, stipulis magnis, ovatis, bipartitis, spinuloso-dentatis, basi utrinque calcaratis. (Tab. LXVI.)
65. *J. tomentella*, caule erectiusculo, bipinnato foliis planiusculis, inaequalitèr bilobis, capillari-multifidis, lobis superioribus bipartitis, inferioribus minutis, stipulis subquadratis, laciniatis, fructu axillari, calycibus oblongis, cylindraceis, hirsutis, ore aperto. (Tab. XXXVI.)

J. tomentella. Moench, *Crypt. Germ.* p. 414.

x x *Segmentis inferioribus, seu minoribus, involutis.*

66. *J. Mackenzii*, caule repente, vagè ramoso foliis inaequalitèr bilobis, lobis superioribus rotundatis, inferioribus minutis, involutis; stipulis magnis, rotundatis, obcordatis fructu laterali terminalique, calycibus obcordatis, depressis, triangularibus; ore contracto, elevato, dentato. (Tab. LIII.)
67. *J. serpyllifolia*, caule repente, vagè pinnatim ramoso foliis inaequalitèr bilobis, lobis superioribus rotundatis, inferioribus minutis, involutis, stipulis rotundatis, acutè bifidis fructu laterali, calycibus latè obovatis, pentagonis, ore contracto, elevato, subdentato. (Tab. XLII.)

J. serpyllifolia. Ehrenb. *Beltz.* 4. p. 45. Wahl. *Lapp.* p. 386.

68. *J. acutifolia*, caule repente, vagè ramoso, foliis inaequalitèr bilobis, lobis superioribus ovatis, acuminatis, apice squamulà curvatis, inferioribus involutis, stipulis ovatis, acutè bifidis fructu laterali, calycibus obovatis, pentagonis; ore contracto, elevato, dentato. (Tab. LI.)

A leaf of var. β , alluded to in the description, is represented in *Suppl.* tab. III.

69. *J. mentifolia*, caule repente, vagè ramoso foliis inaequalitèr bilobis, lobis superioribus hemisphaericis, inferioribus minutis, fere obsolete stipulis ovato-rotundatis, bifidis fructu laterali, calycibus obovato-rotundatis, pentagonis, ore contracto, parùm dentato. (Tab. LII.)
70. *J. calyptrifolia*, caule repente, ramoso foliis inaequalitèr bilobis, lobis superioribus majoribus, calyptriformibus, inferioribus obtusè quadratis, circumvolutis fructu laterali, calycibus oblongis, apice depresso, plano, quinquedentato, ore minuto, contracto. (Tab. XLIII.)

x x x *Segmentis inferioribus, seu minoribus, saecatis.*

71. *J. Hutchinsae*, caule repente, ramoso foliis inaequaliter bilobis, lobis superioribus ovatis, spinuloso-serratis, inferioribus minutis, saecatis, basi emarginata undentatis; stipulis rotundato-ovatis, subserratis, acutè hifidis. fructu laterali, calycibus obovatis, triangularibus. (Tab. i.)

Mr. Mackay has found this species in the south of Ireland, Sir T. Gage upon mountains about Kilmoney, and Mr. Lynch upon rocks, near Lowdore, Cumberland.

72. *J. dilatata*, caule repente, vagè ramoso foliis inaequaliter bilobis, lobis superioribus subrotundis, inferioribus rotundatis, saecatis, stipulis rotundatis, planis, emarginatis fructu terminali, calycibus obovatis, tuberculatis, triangularibus. (Tab. v.)

J. dilatata. Monz, Crypt. Germ. p. 409. Wabl. Lepp. p. 389.

73. *J. Tamarici*, caule repente, pinnatifidè ramoso foliis inaequaliter bilobis, lobis superioribus ovato-rotundatis, inferioribus minutis, obovatis, saecatis, stipulis subquadratis, emarginatis, marginibus revolutis fructu in ramis brevibus terminali, calycibus obovatis, indivisis, triangularibus. (Tab. vi.)

J. tamaricifolia. Monz, Crypt. Germ. p. 399. Wabl. Lepp. p. 387.

B. FRONDOSÆ.

a. Enervæ.

74. *J. pinguis*, fronde oblongâ, decumbente, enervi, carnosâ, superâ planiusculâ, subtis tumidâ, vagè ramosâ, margine sinuâtâ fructu ex inferiore parte prope marginem egrediente, calycibus brevissimis, ore dilatato, fimbriato, calyptrâ exsertâ, oblongo-cylindraceâ, lavi. (Tab. XLVI.)

J. pinguis. Monz, Crypt. Germ. p. 439.

75. *J. multifida*, fronde linearî, eervi, carnosâ, compressâ, pinnatifidè ramosâ, fructu marginali, calycibus brevissimis, ore dilatato, fimbriato calyptrâ exsertâ, oblongo-cylindraceâ, tuberculâtâ. (Tab. XLV.)

J. multifida. Monz, Crypt. Germ. p. 435.

J. palmata. HEDW. Th. ed. 2. p. 169. t. 20. f. 7. HORT. Germ. p. 90. Monz, Crypt. Germ. p. 433. ROTZ, Germ. III. p. 415.

After a careful examination of numberless specimens, upon their native mountains, of what foreign authors have called by the name of *J. palmata*, I can see no reason whatever for separating it from *J. multifida*, nor even for considering it a variety of that plant.

When *J. multifida* grows on decaying trunks of trees and is smaller than usual, it is *J. patens*; in such a state Dr. Taylor lately found it in the neighborhood of Dublin, and sent it me under that name.

I know not what were Dr. Mohr's ideas of *J. palmata* as a species, when he says that Schmidel's figure (in his *Icones*), t. 66, f. f. 16, xvii., belongs to it, and all the rest of the plate is *J. multifida*.

b. Frondes nervo præditæ.

x *Calyce simplici.*

76. *J. Blana*, fronde oblongâ, submembranaceâ, dichotomâ, costatâ, infra apertâ squamosâ, squamis dentatis fructu e costâ parte superiore egrediente, calyce calyptrâque intrafrondosis. (TAB. LXXXII. LXXXIII. LXXXIV.)

77. *J. epiphylla*, fronde oblongâ, submembranaceâ, vagè divisâ, obsolete costatâ, marginem integerrimo, vel sublobato sinuatoque fructu e superiore parte frondium prope apicem egrediente, calycibus subcylindraceis, plicatis, ore parùm dilatato, incisodentato, calyptrâ exsertâ, brevî. (TAB. XLVI.)

J. epiphylla. MOHR, Crypt. Germ. p. 451. WAND. Lepp. p. 397.

78. *J. furcata*, fronde lineari, dichotomâ, membranaceâ, costatâ, supra lavi, subtus marginemque plââ rimâve pilââ fructu ex inferiore parte costam egrediente, calycibus bilobis, conduplicatis, margine ciliato, calyptrâ obovatâ, hispida. (TAB. LV. LVI.)

J. furcata. MOHR, Crypt. Germ. p. 398. WAND. Lepp. p. 598.

79. *J. pubescens*, fronde lineari, dichotomâ, membranaceâ, costatâ, nodique pubescente. (TAB. LXXII.)

x x *Calyce duplici.*

80. *J. Lycii*, fronde oblongâ, subramosâ, tenerâ, costatâ, margine subintegerrimo fructu e superiore parte frondium, calyce duplici, exteriori perbrevis, margine laciniato-dentato, interiori longè exserto, cylindraceo, subplicato, calyptrâ calycem subexcedente. (TAB. LXXVII.)

81. *J. hibernica*, fronde oblongâ, dichotomâ, tenerâ, costatâ, margine integerrimo fructu e superiore parte frondium, calyce duplici, exteriori perbrevis, laciniato, interiori longè exserto, ovato-cylindraceo, subplicato, calyptrâ calyce interiori multâ breviori. (TAB. LXXVIII. and Suppl. TAB. IV. f. 1), *J. hibernica*, nat size, f. 2, portion of ditto, magn. 8, f. 3, calycis dissected, magn. 4, f. 4, capsule, magn. 3, f. 5, capsule, magn. 3, f. 6, seeds and spiral filaments.)

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TO

DAWSON TURNER, ESQ.,

MASTER OF ARTS,

FELLOW OF THE ROYAL, LINNEAN, AND ANTIQUARIAN SOCIETIES,

&c., &c., &c.

THE FOLLOWING SHEETS ARE DEDICATED,

AS

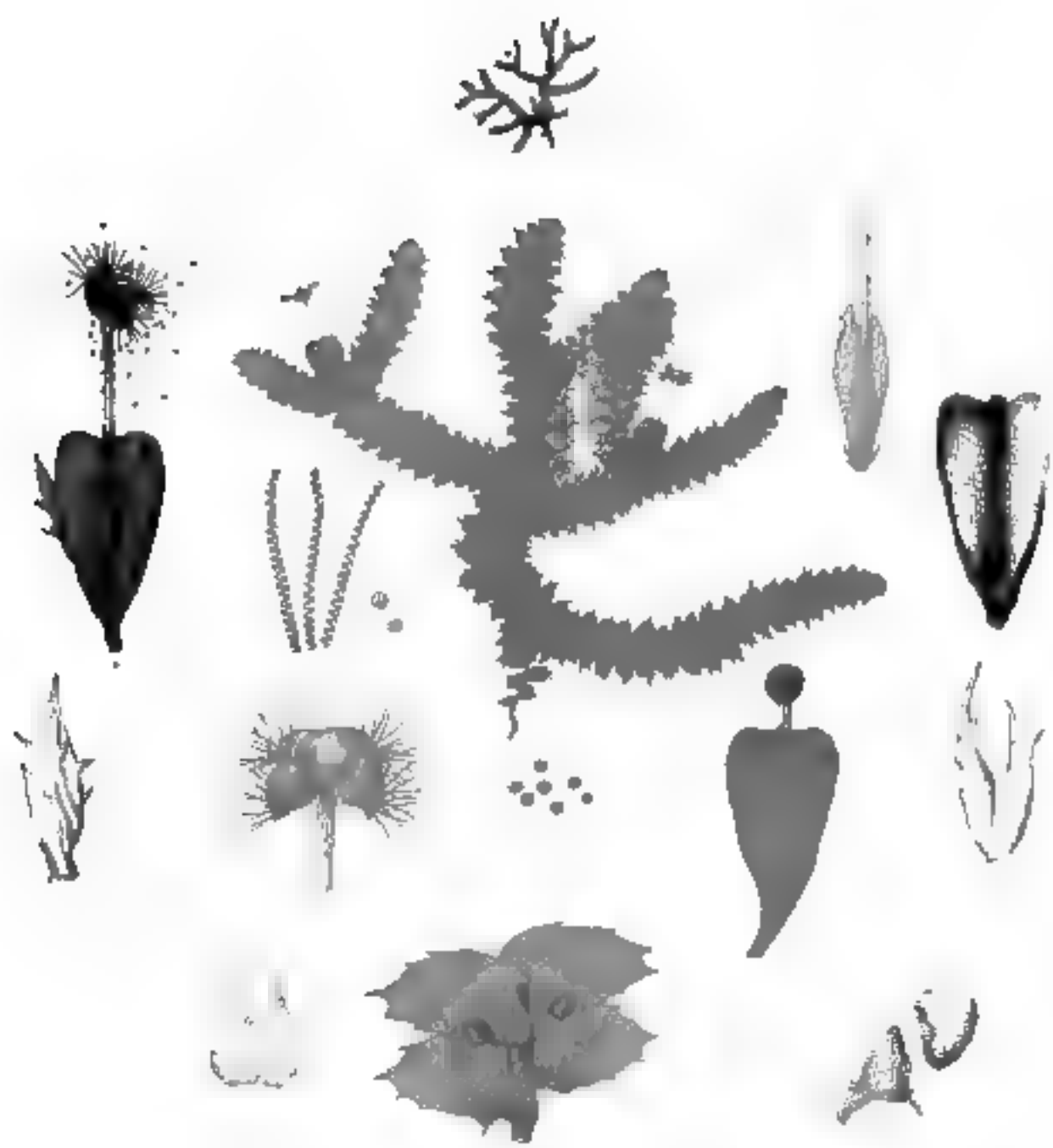
A TESTIMONY OF ESTEEM AND GRATITUDE,

BY HIS AFFECTIONATE

FRIEND AND SON,

W. J. HOOKER.





S. hyperborea Hitchcock

1892

BRITISH JUNGERMANNIÆ.

JUNGERMANNIA HUTCHINSIÆ.

(TAB. I.)

Jungmannia, caule repente, ramoso: foliis distichis, approximatis, ovatis, planis, dentatis, basi subtus auriculatis, nervulis minutis, inflexis stipulis rotundato-ovatis, acutè bifidis, lacinia subintegerrimis: calycibus axillaribus, obcordatis, triangularibus.

Hab. Glenguriff, near Bantry; along the banks of the first river, as you go from Bantry above the water-fall, and in gloomy caverns by the side of other mountain rivulets.
Miss Hutchins.

PLANT, creeping upon the ground in dense imbricated patches, of a deep almost blackish-green color, and extending some inches in diameter producing a few whitish, fibrous radicles from various, but, principally, from the lower parts of the stem.

Stems scarcely the tenth of a line in diameter, an inch or an inch and a half in length, filiform flexuose, furnished here and there with a few rather long, scattered, patent or horizontal branches, which are again either once or twice beset in the same manner with shorter ramuli, or, as frequently happens, divided in a dichotomous manner, the whole of them disposed in the same plane as the stem, whence the plant has a planated appearance. The texture of both stems and branches is by no means brittle, and rather closely cellular: their color a dark olive green inclining to brown.

The *Leaves* (f. 3.) which are bifarious and distichous, are rather loosely imbricated, slightly decurrent at the base, auriculate, about a quarter of a line in length, ovate, plane or but slightly convex on the upper surface, its margins furnished with rather

distinctly-placed, spiniform tooth, the largest generally forming the apex of the leaf, these teeth give the whole plant a most beautiful appearance, and are of such a size as to be conspicuous, even to the naked eye, when the plant is held against the light. that part which is in reality a lower division of the leaf, or *lobule*, or, as it is called by Linnaeus and in the specific character, *ovate* (f. 1.) is very minute, scarcely measuring the twentieth part of a line in length, appearing as *ovate*, inflated appendages, frequently having a spiniform distorted tooth, it is attached near the base of the lower margin of the leaf, or, more correctly speaking, the *lobe*, to the under surface of which it is closely appressed. The reticulation of the whole is small and opaque, with veins or cellular of a very irregular figure, but approaching to *spiciform*. The color is a very dark green with an olive tint. When held against the light the nerves appear of a deeper hue in consequence of their figure. The *flora*, indeed, is not the same throughout the whole plant, as may be seen in the terminal leaves (f. 4.), which do not appear to have arrived at their full size; they differ widely from the rest in being divided into two lanceolate segments, the smaller one of which is the expanded *ovate*, and scarcely a fourth less than the larger division, both are spiniform-distinct. Exactly similar to these are the

Perichloidal leaves (f. f. 11.), of which there are two, embracing with their segments the lower part of the calyx.

Stipular veins, approaching to *orbicular*, divided nearly half way down from the extremity, by an acute sinus, into two, equal, slightly-distorted, sharp segments. There is one stipule to each pair of leaves, which is outer and ensure they closely resemble.

Male Fructification, at present unknown.

FEMALE FRUCTIFICATION, as far as I have hitherto had the opportunity of examining, always arising from the axilla of the branches (f. 5.)

Calyx, (f. f. 6. 9.) rather more than half a line in length, obovate, subperianth and plane on its upper surface, its under side prominent with a longitudinal ridge, so that a transverse section would present the figure of a triangle. the mouth small, contracted, a little elevated and entire.

Calyptra, between oblong and oval, tipped with a short style; its texture rather thick and succulent, every where reticulate of a very pale, yellowish-brown color. A few shorter papillae surround the base, which are minute, linear, or a little swelling to the centre, of a greyish color.

Pedicels, three-quarters of a line long, white, succulent, longitudinally and transversely striated, dilated at its upper extremity, where it unites with the reddish-brown spheroidal

Capitulum, which is externally deeply punctured. it splits into four equal ovate lobes, which soon become revolute, and in that state continue to retain the

Spiral filaments (f. f. 12. 13.) at their extremities. each of these is composed of a single *lobule*, of a deep, rich brown or fulvous color, enclosed in an extremely delicate transparent tube. The seeds (f. f. 14. 15.) are of the same color as the filaments, nearly spherical, and, under a highly magnifying power of the microscope, are seen to be covered with opaque dots, which are probably minute tubercles.

On. I am happy in being able to devote the first plate of a *History of the British Jungermanniæ* to a perfectly new and distinct species, and still more so in the opportunity it affords me of dedicating that species, one of the most beautiful with which I am acquainted, to its discoverer, Miss Hutchinsle, of Ballylickey near Bantry; a lady whose valuable communications on the subject of marine Botany are already before the public in the *Historia Fucorum*, as well as in the *British Conferve*, and whose zeal and knowledge in the present genus of plants I shall frequently have occasion to notice in the progress of this little work. To her, through the kindness of my friend, Mr. Turner, I am indebted for many of the most rare and interesting species which will here be described.

J. Hutchinsle was originally found, two years since, growing on a spot of ground which also produced *J. trichophylla* and *Saxifraga* Geom. It belongs to a small but very natural family (including *J. dilatata* and *temariocifolia*, differing from the rest of the *Jungermanniæ stipitata* in having a lobular, or what, in compliance with the Linnæan terminology, I am induced to call scrible, which, in by far the greater number of the leaves, is rolled up into a small vesiculated appendage, and in having each of the spiral filaments composed of a single hair attached by its base to the extremity of the segments of the capsule, and enveloped in an extremely thin pellucid tube. From the two *Jungermanniæ* last mentioned, the present species abundantly differs in a variety of respects, and may at all times readily be distinguished by its dark-green color, and still more certainly by the strongly denticulated margins of the leaves.

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12. Upper part of the Peduncle and Capsule; the calyx expanded and retaining the spiral filaments	3
13. Spiral filaments enclosed in their tube	1
14. Seeds	2
15. The same	1



.





Juniperus communis pulchra

JUNGERMANNIA JULACEA

(TAB. II.)

JUNGERMANNIA, caule erectiusculo, vagis ramosis, filiformi. foliis quadrifidis, ovalis, archè imbricatis, erectis, acutè bifidis; segmentis lanceolatis, acuminatis, subseratis. fractu terminali; calycibus oblongis, superne plicatis; ore aperto, dentato.

Jungermannia julacea. LICH. Sp. Pl. 1. p. 1603. Syst. Nat. 11 p. 706. Fl. Lapp. ed. SMITH p. 349. SCHREANK. Samml. 1. p. 4. n. 84. WEBER, Spicil. p. 151 n. 215. HEDB. Aggl. p. 516. LICHEN. Scot. 1. p. 785. WITH. III. p. 863. LICH. Syst. ed. Gmel. 12. p. 1352. LAMARCK, Encycl. Bot. 11. p. 285. Engl. Bot. t. 1044.

Jungermannia corda filiformis, foliis appressis, inconspicuis. HALL. Hb. 11. p. 63. n. 1692. *Lichenestrum alpinum, Bryi julacei argentei facie.* DILL. Musc. 1. 73. f. 38.

β. GRACILIS; caulibus elongatis foliis parvis, remotiusculis.

HAB. Welsh mountains, Dillwyn and Mr. Griffith.—Ben Lawers and Craigallnach, in Breadalban, Ben Nevis, Ben Loyal, and Cairngorran.—β. On the summit of Ben Nevis, in wet places at its eastern extremity.

PLANT growing in dense patches of considerable extent; when barren thickly entangled and matted together.

Stems in a barren state usually procumbent in fertile specimens erect, from half an inch to an inch and a half in length, of an equal thickness throughout, of a dirty brown color, rigid and brittle when dry. Irregularly divided, and generally more or less beset with branches, which are equally uncertain in their number, disposition, and length, and are subpatent.

Leaves closely imbricated and appressed, surrounding the stem on four sides (l. 5) and entirely concealing it, erect, nearly ovate, flat, or but very slightly concave, acutely cleft to about three-fourths of their length into two equal segments, which are straight, oval-lanceolate and acuminate, their margins very obscurely serrated the terminal leaves, which usually grow in clusters, differ from the rest in having the segments more lanceolate and acute, and in being more evidently, though very unequally, serrated.

The reticulation (f. 7) is large in proportion to the size of the leaf, and formed by cells of a somewhat rounded figure, which are opaque in the centre. The color of the leaves, when the plant grows in the shady crevices of rocks, is generally a dirty green approaching to olive, but when it is in a more exposed situation, it is a pale silvery white, which under the microscope seems to be caused by an extremely minute granulated substance, probably an exudation from the leaves. This color and appearance are particularly prevalent in wet spongy places and may for β (f. 16) possesses them in a very striking degree.

The perichetial leaves (f. f. 8, 8) surround the calyx for nearly a third of its height, the exterior ones differ from those of the stem only in being larger and somewhat plicated, the interior are quadripartite, much resembling the stem-leaves of *J. setiformis*.

Male Frustrification I have not seen.

FEMALE Frustrification terminal upon the stems and branches.

Calyx (f. 9) oblong, longitudinally plicated in the upper part, and toothed or lacerated on the margin, where it is white and diaphanous, while the rest is of a dirty brown or olive color, the whole comparatively of a rigid texture, marked throughout with small oblong reticulations (f. 10)

Ovary (f. 14) ovate, thin, of a dirty white color, reticulated, tipped with a minute style, and bearing near its base two or three abortive pistilla the base itself is firmly united to the lower part of the calyx, and not separable from it.

Peduncle scarcely a quarter of an inch in length, white, succulent, longitudinally and transversely striated.

Capsule (f. 8) globose, of a shining brownish black, opening into four equal, ovate valves (f. f. 11, 12), which, after the discharge of the seeds, become revolute, some of the filaments still remaining attached to the centre.

Seeds and spiral filaments (f. 13) reddish brown, the former spherical and smooth, the latter short in proportion to their width, and formed of a double helix.

For β (f. 15) grows to the height of nearly two inches, and has its stem and branches slender in proportion to their length, bearing also more distantly-placed, smaller and less-appressed leaves than α . The silvery hue is, as I have before mentioned, very striking in this variety.

Jungermannia julana Hedw.

J. julana, which is altogether an alpine species and a plant of infrequent occurrence, is, by its size, its mode of growth, and its color, readily distinguishable from every other except indeed from *J. conopsea*, to which in all these particulars it is very nearly allied. From this it differs, as well in the shape of the leaves, as in their disposition, they having the appearance of being imbricated on all sides, though in reality they are quadrifidius, whence arises a quadrangular form in the stems and branches. These shoots too are of an equal thickness

BRITISH JUNGERMANNIE.

(*J. pulcr.*)

Throughout, instead of being evidently incrassated towards the extremities, and the calyxes are large in proportion to the size of the plant; whereas I have never been able, in the specimens I have examined of *J. concinnata*, to satisfy myself of the actual existence of any calyx at all. Truly however, and essentially as these two species are distinct, they have been confounded by the older writers, and, indeed, appear to have been so by almost every author prior to the time of Lightfoot; so that I dare not venture to speak with certainty of the greater part of the above synonymy. That of Dillenius, indeed, admits of no doubt, and his figures are excellent. The similarity to *Bryum argenteum*, however, which he dwells upon, and which has given birth to the name* of the species before us, arising from its color and from its somewhat closely-appressed leaves, is more applicable to *J. concinnata* Linnaeus plant, judging from his description, as well as from the specimens in his herbarium is the same as ours. Weber seems rather to refer to *J. concinnata*, when he says it has leaves "ita appressa, ut vix un leate quidem distinctus possint. (quæ notâ ad omnibus facili distinguitur); and that the auriculis are, when young, "hæc virides, splendentes," but in a dry state "argenteo splendore donati, omnino ut *Bryum argenteum*." Yet in another passage he remarks, "Setas non vidit, verum auriculis versus apicem incrassatis, terminatis calyculis membranaceis, pallidulis, parvis granulis repletis," which can only be said of *J. pulcr.*, *J. concinnata* being destitute of calyxes. Hudson has done no more than copied the words of Linnaeus. Lightfoot has well distinguished the two, and we are indebted to him for first describing *J. concinnata*. The figure in the *Flora Danica*, quoted by Withering, does not represent our plant, though the description of this latter author may be intended for it as that of Haller certainly is.

Other writers, besides those above mentioned, have introduced in their works *J. pulcr.* but these in my opinion all mean *J. concinnata*. Among them are Doctor Rich and Zehner, the latter of whom in particular says the leaves of *J. pulcr.* are bilobous †, which is undoubtedly the case with *J. concinnata*, but not with this. Their exact situation, however, is not easily determinable as no diminutive or young plant nor was it till after a careful investigation that I was able to satisfy myself that they were placed as ours.

Mr. Sowerby, in his otherwise excellent figure in *English Botany*, has represented the leaves as undivided, which is never the case in the plant; although, owing to the deepness of the cleft and the brittleness of the texture, it is more easy to separate half a leaf from the stem than a whole one.

* *Bryum argenteum* was called by Dillenius "*Bryum pendulum pulcrum argenteum in utrumque*."

† Zehner even goes further, and says, that all the *Jungermannia foliosa* have bilobous leaves, in which he is unquestionably mistaken. His words are, "Die *Jungermannia foliosa* L. hat, so wie alle die bilobaten weichen *Jungermannia foliosa*, folio bilobis, und daher also einen kleinen ungedrückt sind, so fällt solchen ihre weiche, als bei andern *J. pulcr.* in der Länge, kann also dennoch recht gut gesehen werden." Beitr. Band. 2, p. 101.

REFERENCES

REFERENCES TO THE PLATE.

FIG.

- | | |
|--|---|
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| 9. <i>Calyx and capsule</i> | 4 |
| 10. <i>Portion of the margin of the calyx</i> | 1 |
| 11. <i>Capsule discharging its seeds</i> | 4 |
| 12. <i>Valve of the capsule</i> | 3 |
| 13. <i>Seeds and spiral filaments</i> | 1 |
| 14. <i>Calyptra, with a portion of the calyx at its base</i> | 4 |
| 15. <i>Portion of the stem of Var. β</i> | 5 |





pyramidalis constricta

JUNGERMANNIA CONCINNATA.

(TAB. III.)

JUNGERMANNIA, caule erecto, ramoso, apice incrassato compressoque foliis bifariis, articulis imbricatis, compactis, erectis, concavis, ovatis, obtusis, emarginatis fructu terminali, calycibus nullis.

Jungermannia concinnata. LIGHTFT. Scot. 17. p. 786. WITT. 111. p. 863. Engl. Bot. t. 2329.

Jungermannia jalapa. Fl. Dan. t. 1002. (bent.) HOFFMANN, Germ. 11. p. 82. ROSE,

Germ. 111. p. 366. SCHNEIDER, Spich. p. 75. LAMOUR, Fl. Fr. ed. 2. 11. p. 437.

HAB. Batten spongy places near the summits of the Scotch and Irish mountains, abundant.

PLANT growing always in very thickly-matted tufts, often covering a surface of ground of some feet in diameter; conspicuous at a considerable distance from its silvery base.

Stems nearly erect, occasionally protuberant at the base, varying from their most common height of scarcely half an inch to an inch or more, simple, or bearing here and there a few, scattered, patent or suberect branches, which, as well as the stems themselves, are cylindrical and filiform in their lower parts, but towards the apices visibly incrassated and compressed: the color of both stems and branches is a dirty brown; when dry they are brittle.

Leaves (f. 4-5) erect, bifarious, closely imbricated in two rows, so as entirely to conceal the stem, resembling (as Lightfoot well remarks), under a highly-magnifying power, the texture of a braided lock of hair, or that of a plaited-thonged whip: they are concave, ovate, acutely emarginate at the extremity, with obtuse and entire segments. The cellular are minute, the interstices wide, forming a pellucid reticulation. The color is a yellowish green, more or less inclining to brown, having a silvery and glossy appearance like that of *Bryum argenteum*, which cannot well be represented in the drawing, and is particularly conspicuous in the dry specimen. Some plants, indeed, which grow on much exposed rocks, want this appearance altogether, and are of a deep purplish brown almost inclining to black: in every state much of the margin of the leaf, and sometimes the extremity, for one-third of the way down, is diaphanous, whitish, and, as it were, scarious.

The *perichætal leaves* (f. 6 & 7) are imbricated on all sides; the exterior resemble the cauline ones, except in being somewhat larger, the rest gradually grow wider in proportion to their length, and become less scarious at the margin, firmly embracing and surrounding each other, the innermost appear to answer the purpose of a calyx, enclosing the peduncle in the form of a cylindrical tube, which, indeed, is scarcely distinguishable from a true calyx, except by the longitudinal suture, formed by the involuted margins (f. 7), in color and texture they resemble the other leaves, only that they are paler and have generally a purple or brownish tinge near the apex.

Male Fructification I have never seen.

Female Fructification terminal on the stems and branches.

Calyx none that I have ever been able to discover

Calyptra (f. 8) ovate, pellucid, white, surrounded at the base with a few barren perianths, some of which I have seen attached here and there to various parts of its surface.

Pedicels white, succulent, scarcely a quarter of an inch long, striated longitudinally and, also, though less evidently, transversely

Capsule minute, nearly spherical, of a reddish and shining brown color, strongly punctated.

It bursts into four equal, ovate segments, discharging numerous and extremely minute

Seeds and *spiral filaments*, which I had not an opportunity of representing on the plate, not having received them till the engraving was finished they are of a deep fulvous color, the former exactly spherical, the latter somewhat longer than those of *J. julaceæ*, and composed of a double helix

This species grows profusely on the summits of the mountains of the North Highlands of Scotland, and appears to be equally common on the Continent. In Iceland it is likewise extremely abundant, more so than any of the genus, and I suspect is every where more frequently met with than *J. julaceæ*, which, as already observed under that plant, it greatly resembles in many particulars. Its mode of growth is very uniform, and the even tops of all the shoots is striking, though it occasionally happens that specimens are found from the centre of the thick blunt ends of which are produced small, thin, cylindrical shoots, either simple or forked, as in *Betula fontana* or *Ficus umbellata*, destined in all probability to supply the flowers of the following season, and then to grow in every respect similar to the stems they proceeded from.

It is to Mr Lightfoot, as has been also observed under the description of *J. julaceæ*, that the credit is due of first distinguishing the two plants, and accurately defining their characters. *J. concolorata* has, indeed, long been well-known on the Continent, though not separated from *J. julaceæ*, under which name many of those authors have described it, misled, perhaps, by a remark of Ehrhart, in his *Beitrag**, where he says that *J. julaceæ* has bilobed leaves. The

* *Beitrag* *Berol.* iii. p. 89.

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(*J. constricta*.)

figure in *Flora Danica* is good, except that the terminal or perichætal leaves are not represented as imbricated on all sides, and something like a calyx is there given as rising above the leaves, which I have never been able to observe in the many specimens that have come under my observation. Roth also describes a calyx "in caule vel ramis terminalis, monophyllus, tubulosus, truncatus" probably mistaking the inner perichætal leaf, as I myself did at first for a true calyx. I however was afterwards induced to be of a different opinion, and in various dissections have uniformly found this species to possess, instead of the calyx, an inner and tubular perichætal leaf, as above described. If I have not been deceived in my examination of this species, by the minuteness of the object, the absence of a real calyx in this plant may be considered as connecting it more closely with the order of *Muncl*, and especially with the genus *Asarum*, to two of the species of which (*A. rupestre* and *alpina*) it approaches, also, in habit and ramification.

REFERENCES TO THE PLATE.

no.

- | | | |
|---------|--|---|
| 1, 1, 1 | Bare plants of <i>J. constricta</i> , natural size. | |
| 2. | Female plant, natural size. | |
| 3. | Female plant magnified | 6 |
| 4. | Portion of the stem and leaves | 4 |
| 5. | Leaf | 2 |
| 6, 6 | Exterior perichætal leaves | 3 |
| 7 | Interior perichætal leaf | 3 |
| 8. | Extremity of a fructified stem, with a portion of the inner perichætal leaf, calyptra, peduncle, and capsule | 4 |





Juniperus communis

JUNGERMANNIA JUNIPERINA.

(TAB. IV.)

Jungermannia, caulis erecta, simpliciter, rigida; foliis imbricatis, lanceolato-linearibus, bipartitis, mucronatis. Sw.

Jungermannia juniperina. Swartz, *Prod.* p. 144. *Fl. Ind. Occ.* p. 1855.

β . *Jungermannia*, caulis erecta, flexuosa, subsimpli- foliis quadrifidis, undique imbricatis, filicis-secundis, linearibus-lanceolatis, bipartitis; segmentis rectis, mucronatis fructu terminali; calycibus ovatis, heliois, pericarpio oblectis.

Jungermannia adumosa. Dickson, *Crypt. fasc. III* p. 12. t. viii. f. 8. Wirtz III. p. 802.

Hab. β . On shady spots on the Scotch Alps. Mr. Dickson.—On Cairngorms, Ben Nevis, Ben Lawers Ben Arthur, and on Ben-y-callich, in the Isle of Skye.—On mountains near Bantry, Ireland. Miss Hutchins.

Obs. The variety β alone, of this species, having been found in Britain, to that I shall confine my description.

PLANT growing erect in densely-crowded tufts of several inches in diameter

Stems scarcely so thick as pack-thread, and of rather a bright reddish-brown color, from two to three and even five inches in length, flexuose, having the apices slightly incurved, either simple, or now and then producing a solitary short lateral shoot. or, as is sometimes the case, divided near the extremity into five or six branches of nearly equal height.

Leaves in four rows, in some specimens thickly imbricated, in others more widely placed, of a lanceolate figure, filicis-secund, divided for nearly three parts of their length by an acute sinus, into two equal, entire, acuminate and strait, or at most but little divaricating, segments the terminal leaves (f. 4) are more inclining to ovate, and have always the lower half diaphanous, the upper one being of the same color as the whole of the other leaves, a yellow brown, pale in general, but deeper in

more exposed situations. The substance is extremely rigid, composed of distinctly-placed, oblong, opaque cells, the interstices of which are pitted.

Perichætal leaves numerous, crowded, so united together at their bases as to constitute a complete calyx. Their acuminate segments above are free, and form a laciniate margin.

Male Fructification I have never seen.

Female Fruit fig. 7 on terminal.

Calyx (f. 6) about three-quarters of a line long, an ovate, plicate, tubular membrane, formed, as before observed, by the union of several of the perichætal leaves, the lower undivided halves of which grow so entirely joined, that no suture is visible, while the segments, remaining separate, exhibit the appearance of a quantity of erect lanceolate lobes, exactly equal in number to double the quantity of leaves connected.

Calyx ovate, white, semi-transparent, tipped with a short brown style, and surrounded at the base by numerous greyish abortive peristyles, which are almost linear, or slightly incrassate towards the base.

Peduncle short, scarcely two lines in length, white, pallid, callous.

Capsule subrotund-ovate, dark brown, dividing into four equal ovate valves.

Seeds and spiral filaments (f. 7) of a deep fulvous color; the former spherical, the latter composed of a double setis, slightly attenuated at each extremity.

—————

J. juniperina has no affinity whatever with any British species, but approaches, so well in habit as in the texture of its leaves, to a *Jungermannia* not yet described, gathered in New Zealand, by Mr. Menzies. After a most careful examination of authentic specimens of Mr. Dickson's *J. adamsi* compared with others of *J. juniperina*, which I have received from Dr. Swartz, I am not able to find any characters which can induce me to keep them separate. The latter plant is indeed of a larger size than the former, and possesses one striking peculiarity, which is, that, on immersing a dry specimen in water, the absorbent vessels are immediately put in action, and the remarkable divarication of the segments of the leaves, noticed by Dr. Swartz, appears almost at the same moment: the lobes of the calyx, too, become reflexed. Our British variety, on the contrary, recovers extremely slowly in water, and after an immersion, even of very long duration, the segments of the leaves still remain straight, and those of the calyx erect. It is singular that the only stations of this plant at present known are the loftiest of the British Alps and the Blue mountains in Jamaica.

Specimens in fructification of my var. δ are of rare occurrence. I possess them only through the kindness of Mr. Dickson, who gathered them in Scotland. The figure and description of the species in the *Fasc. Plant. Oxypt.* are good, except that they represent it as having undivided leaves. The peculiar structure of the calyx did not escape the observation of the author of the *Flora Indica Occidentalis*, who has accurately described the Jamaican variety in the following words: "*Perianthium e foliis externis, confertis, bipartitis, potentil-reflexis internis erectis, indivisis, cæcis, transverse, pallidis, rigidis.*"

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(*J. juniperina*.)

I have already, in a paper printed in the *Transactions of the Linnean Society*, v. 2. p. 598, taken the opportunity of remarking, under the description of *Andros nitida*, the general resemblance which that plant at first sight bears to the present one. Their places of growth are the same, as are their alternate-secund leaves and the lacurved extremities of the branches, as well as the color of the whole plant. The *Andros*, however, possesses really entire leaves, which are furnished with a strong nerve.

REFERENCES TO THE PLATE.

FIG.

1, 1, 1, 1, 1.	Bare plants of <i>J. juniperina</i> , natural size.	
2	Fertile plant, natural size.	
3.	Portion of the stem and leaves magnified	3
4.	Terminal leaf	3
5.	Fructified extremity	4
6.	Calyx	3
7	Seeds and spiral filaments	1



Jaspe rupestris et foliata

JUNGERMANNIA DILATATA.

(TAB. V.)

JUNGERMANNIA, sterculo repente, vagè ramoso: foliis distichis, unibracteis, subrotundis, convexiusculis, integerrimis; basi subtile mucronatis; apiculâ parvâ, ventriculâ stipulis rotundatis, pinnatis, emarginatis calycibus terminalibus, obcordatis, tuberculatis, triangularibus.

Jungermannia dilatata. LINN. *Sp. Pl.* 11. p. 1800. *Syst. Nat.* 12. p. 706. *Fl. Suec.* p. 409. GOUAN, *Mém.* p. 482. POLKING, *Pal.* 11. p. 199. SCOP. *Cern.* 11. p. 346. LAMOUR, *Herb.* p. 251. WISE, *Plant. Crypt.* p. 126. WAKER, *Spec. Fl. Geet.* p. 146. WILLD. *Ber.* p. 341. QUARR, *Enum. Pl. Fl. Dan.* p. 49. ALPHEA, *Pal.* 11. p. 313. SCHREYER, *Bolesche Flora.* 1. p. 499. VILLARS, *v.* p. 925. HOFFMANN, *Germ.* 11. p. 85. REICHARD, *Cent.* p. 439. HEDD. *Engl.* p. 514. LIGHTFOOT, *Scot.* 1. p. 781. LINN. *Syst. Nat.* ed. Ouel. 1. p. 1321. WITT. III. p. 840. LAMARCK, *Fl. Fr.* ed. 2. 1. p. 434.

Jungermannia isemericifolia. SCHREYER, *Spic. Fl. Lys.* p. 108. SCHREYER, *Somm. Lys.* 2. p. 8. SCHMIDT, *Icones.* p. 259. t. 57. *Engl. Bot.* t. 1086. ROTH, *Germ.* 11. p. 408.

Jungermannia cupressiformis. LAMARCK, *Encycl.* 11. p. 383.

Lichenastrum imbricatum minus. RALL. *Syn.* p. 111.

Muscodes minimum, foliis alternis, superioribus circinnatis, inferioribus cucullatis, flore pediculis ferme carente. MICHELL, *Nov. Gen.* p. 10. t. 6. f. 8.

Hepaticoides, foliis subrotundis squamatis incumbens admodum. VAILLANT, *Bot. Paris.* p. 100. n. 8. t. 19. f. 10.

Lichenastrum imbricatum minus, synonymis coccato-coccato. DILL. *Musc.* p. 497. t. 73. f. 27.

Jungermannia, foliis imbricatis, alternis, orbiculatis, setis brevissimis. MALL. *Held.* 11. p. 52.

HAB. On the trunks of trees, most abundant, every where.—In fruit during most of the winter season.

PLANT firmly attached to its place of growth, where it forms dense, compact and circular, brownish-purple patches, from two to many inches in diameter.

Stem about three-quarters of an inch in length, articulated one over another, creeping.

Branches, once or twice irregularly divided into many short, patent branches, of which the fertile ones are somewhat incumbent upwards the rest are filiform throughout.

Leaves (f. 4) bilobed and distichous, alternate, articulated, distantly placed in the lower parts of the plant. The root is closely articulated so entirely to run the upper side of the corolla. The corolla more scarcely exceeding the fifth of a line in diameter, those in the fertile shoots becoming rather larger as they approach the calyx they are of an orbicular figure, above slightly convex, varying in color from a deep purple hue to an olive-green as more shaded specimens, entirely devoid of gloss, furnished at their base with an areole (f. 4), which generally assumes more to a greenish hue and is in its appearance widely unlike the leaf in different parts of the plant putting on a different appearance (f. 5). In the lower branches this areole is about one-fourth of the size of the leaf, attached to its lower margin, and closely appressed to its lower surface, nearly spherical, with an opening beneath, whence Michx. has aptly applied to it the term "areolator". In the fruitifying branches the same formation of the areole is apparent in the lower parts, but in proportion as it approaches the extremity, the lower vessels gradually unfold. In the fourth pair from the calyx the opening appears wider in the next above them the margins only are remarkably revolute, in the succeeding pair the margins are so far unfolded as to exhibit a lateral tooth, while the uppermost pair, or

Perianthial leaves (f. 7) have the areole an oblong obtuse, half-like appendage, the margins still a little revolute, and the areole furnished with one or sometimes two long and sharp teeth, this areole is appressed with its lower and inner surface to the outer side of the calyx, while the leaf, which is here more inclining to ovate than in any other part of the plant, has its lower surface applied to the upper side of the calyx. The texture of these leaves is exactly similar to that of the rest, composed of exceedingly minute rounded cells, scarcely visible but with a high power of the microscope.

Perigonal leaves, from twenty to thirty or more in number, very closely articulated, upon short branches rather smaller than the corolla ones, and remarkably narrow or trifurcate. The areole is about one-third of the size of the leaf, ovate, revolute, each closely tiled over the one above it.

Stipules (f. 6) somewhat wider than the stem, one to each pair of leaves, ovate, appressed to round, quite plane, cleft at the extremity with rather a deep and acute notch. These stipules alter their figure as they approach the calyx, becoming larger and divided into three or four unequal lobes, of which in the calyxine stipule there are five or six (f. 8). These lobes resemble that of the leaves, their color, from being long exposed to the light and on portions less of the purple tint, and generally is of a dirty green.

Male FACETIOLATION situated in the axilla of the perigonal leaves, upon the short lateral ramell.

These perigonal leaves are remarkably closely articulated, so much so, that the ramellous axis from above has very much the appearance of that of *J. maritima*, and the whole length

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(J. dilatata.)

of it is marked with a deep line or furrow. In each anther are two and sometimes three anthers*, small, spherical, and when perfect of an olive-green color, after the discharge of the pollen, a reticulated, diaphanous cuticle remains, open and incurved at the top. The filament is about the length of the anther, white, pulvinate, transversely striated. In January, 1866, I gathered specimens of this plant, upon the under sides of the stems and branches of which were scattered clusters of minute spherical granules (f. f. p. 10), whitish, but inclining to flesh-colored, sessile, on an extremely short footstalk. Then, however, as I was unable to perceive any thing resembling the usual reticulated structure of the anthers of the genus, I was (even before I became acquainted with the true male organs) rather inclined to suspect were some adventitious substance, in which opinion I am now more fully confirmed.

FEMALE FRUCTIFICATION terminal upon the branches.

Calyx (f. f. 11. 12. 13. 14. 15) two-thirds of a line long, obovate, approaching to chordiform, plane on its upper surface (f. 11) from its under surface there is a projecting ridge or angle (f. f. 12. 13), widest at its base, which, together with the two angular sides of the calyx form a triangle in a transverse section. The whole is externally beset with numerous minute fleshy tubercles, the mouth is exceedingly contracted, and forms a small hollow apiculus, which divides in halves for the emission of the capsule. The color is usually a deep purplish brown above, below more or less green.

Germen (f. 17), when arrived at its full size, of a beautiful green color, surmounted by a long and slender style (f. 18), dilated at the mouth, streaked longitudinally with reddish lines, and transversely with greyish ones. At the base of the germen are attached a few *barres pistillæ* of a greyish color, swollen at the base.

Calyptra (f. 14) oblongo-obovate, rather fleshy, whitish, of a compact texture, scarcely appearing reticulated.

Pedicule white, succulent, cellular, about half as long again as the calyx.

Capule (f. 13) spherical, pale yellow brown, bursting into four acute, ovate valves (f. 13).

The seeds being discharged, the naked extremity of the peduncle becomes visible within the capsule, and forms a greyish, semi-pellucid orbicular base (f. 14).

Seeds (f. 16) fulvous, spherical, minutely tuberculated, so as to have a spotted appearance. The *apical filament* (f. 12) consisting of a simple hair, enclosed in an extremely delicate, transparent tube, both adhering by their base to the apices of the valves of the capsule, where they represent a beautiful tuft or crest on each (f. f. 13. 14. 15).

* Schmidt says not equally furnished with myself; being unable to detect, or even to guess correctly in the direction of, the numbers in this species. "Floridus junis," he says, "callos citius jam suis adultis, ut ejus tubus brevior; quare fore videtur, sed, nisi quare citius callos eductos, brevioribus tubis, adeo ut apertis callos dum purpur locis ex aculeis florulis, quæ apices er. An vero ab eodem sexu corpus stipulatus jam adfectus, primordia feminis florulis brevioribus? An in apice ramosum, quodammodo effectum, brevioribus jam sit et hinc cunctis granulum subminuente? Nihilominus ex brevibus quod brevioribus sit per se videtur." Schmidt, *Icones*, p. 258.

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(*J. dilatata*.)

ment to the anthers, are destined, in all probability, like the fruit-bearing twigs of many species of *Ferns*, to form with their leaves larger ramuli, and such as are produced in other parts of the plant. This at least is certain, that in those among them in which are found anthers past perfection and fast approaching a state of decay, the leaves appear in full vigor and of an equal freshness with the common outline ones.

The male fructification, it ought to be remarked, may be seen on the same individual as with the female, though it is by far more abundant on separate plants. So that, in this instance, as I have also had occasion to observe in some others, the genus is to be considered both monocious and dioecious. The greater number of anthers, in the month of March, had performed their destined functions, in the discharge of the pollen: so, too, had the greater number of capsules ripened and dispersed their seeds.

Of the synonyms above quoted I dare not venture to speak with confidence of any, except that of Schrebler. I think, however, I am correct in those of *Eagl. Botany*, *Roth*, and *Scheuchzer*.

REFERENCES TO THE PLATE.

fig.

1, 1	<i>J. dilatata</i> , natural size.	
2.	The same magnified	6
3.	Extremity of a fertile shoot, lower surface	4
4.	Leaf and auricle	3
5.	Stipule	3
6.	Portion of a sterule, with auricles and stipules	4
7.	Perichætal leaf and auricles	3
8.	Calycine stipule	3
9.	Portion of a sterule, with male fructification (*)	4
10.	Anthers (*)	3
11.	Upper surface of the calyx	3
12.	Under surface of the calyx, with the capsule	3
13.	The same with the capsule expanded	3
14.	The same in the act of dispersing its seeds	8
15.	Inside of a portion of the calyx	1
16.	Calyptra and lower part of the peduncle	8
17.	Germen, with its style and a barren pistillum	2
18.	Style	1
19.	Inside of an expanded capsule	9
20.	Seeds	2 and 1
21.	Spiral filaments, enclosed in their tubes	1





Scrophularia sp. Linn.

JUNGERMANNIA TAMARISCI.

(TAB. VI.)

JUNGERMANNIA, caeruleo repente, pinnatim ramoso foliis distichis, imbricatis, ovato-rotundatis, connatis, integerrimis, auriculatis; auricula minutis, obovatis, ventricosis, stipula subquadratis, emarginatis, marginibus revolutis calycibus in racis intervalibus terminalibus, obovatis, brevibus, obtusè triangularibus.

*Jungermannia Tamarisci** LAMOUR. Sp. Pl. ii. p. 1800. Syst. Nat. ii. p. 706. Fl. Lapp. p. 342. Fl. Suec. p. 402. POLLICH, Pal. iii. p. 194. LIEBR, Herb. p. 251. SCHREYER, Balneische Flora. i. p. 498. WEIS, Plant. Crypt. p. 129. WASSER, Spic. Fl. Goet. p. 149. WILLD, Ber. p. 341. OCHS, Enum. Pl. Fl. Don. p. 42. ALLIOM, Fl. Ped. ii. p. 313. VILLAR, iv. p. 525. HOFFMANN, Germ. ii. p. 86. BELMAY, Conn. p. 439. HUBB. Angl. p. 315. LEONH. Scot. ii. p. 781. LICH. Syst. Nat. ed. Gmel. ii. p. 1351. WITB. iii. p. 800. LAMARCK, Fl. Fr. ed. 2. ii. p. 433.

Jungermannia rubiginosa. NECK, Act. Pal. ii. p. 447 t. 1 f. 3.

Jungermannia dilatata. ROTH, Germ. iii. p. 406.

Jungermannia nigricans. LAMARCK, Hercul. vi. p. 383.

Hepaticoides, quæ *Muscus trichomanoides, terrestris, minor, floridus*. VAILLANT, Bot. Paris. p. 100. t. 23. f. 10.

Muscoides squarrosum, caeruleum, nigro-purpureum, auriculis angustioribus, foliis circinatis, minoribus. MICHAEL, Nov. Gen. p. 10. t. 6. f. 5.

Lichenastrum imbricatum, Tamarisci Narbonensis facie. DILL. Musc. t. 72. f. 51.

Jungermannia foliis imbricatis rotundis, superioribus alternis, connatis, inferioribus quadrifariis. HALL. Herb. iii. p. 61.

HAB. On the ground, and creeping over low bushes; in much exposed, sub-alpine situations, plentiful.

* Most authors, and even Linnaeus himself, in his *Flora Suecica*, have adopted the name *amaricifolia*. *Tamarisci*, however, is the one taken up in the *Système Naturel* and *Species Plantarum*, for which reason, as well as because it appears to me more applicable than *amaricifolia*, I have thought proper to retain it.

Plant spreading in large patches of great extent, loosely attached to its place of growth.

Sorcell from two to four inches in length, basely lubricated, creeping, sessile, filiform, of a deep brown, sometimes a black color. branched in a pinnated or bipinnated manner with patent or horizontal planes, for the most part alternate, and standing two or three lines from each other, short, but of unequal lengths, and beset with still shorter patent pinnule.

Leaves (f. 4) bifarious and distichous: at the base the shoot is generally bare, or at most has the leaves distal and much decayed, while in the other parts they are densely and alternately imbricated over the whole upper surface of the sorcellus they are about one third of a line long in the larger branches, except at their apices, where, as well as on the smaller ramuli, they are much smaller, and scarcely extending half that size. In the fertile shoots, on the contrary, they are smaller at the base, and gradually increase in size towards the extremity; their shape is ovate, more or less approaching to round, convex above, the margin a little revolute, especially towards the ends of the leaves, which, indeed, in dried specimens, are generally as much up as to embrace the under side of the sorcellus. Their color, like that of *J. dilatata*, varies from a deep purplish brown, to a yellow or dirty green, above they are glossy the cellular, of which the leaf is composed, are small, roundish, forming a most beautiful minute reticulation. Attached to the lower margin of the leaf is an ovate, appressed to its lower surface near the point of insertion scarcely equalling the twentieth of a line in length, obtuse, inflated, having no visible opening below at the base; on the third or fourth pair from the apex of the fertile shoots, however, an oblong opening is evident, and in proportion as they are situated nearer the calyx, this vesiculated appendage becomes more expanded, so that, in the second pair from the calyx, it is about one fourth of the size of the leaf, oblongo-ovate, obtuse, convex on its under surface, concave on its upper, the margin revolute.

The perigonial leaves, from six to eight in number, are closely tiled over each other, of a roundish figure, ventricose, their surface, too, are ovate, ventricose, and closely imbricated.

The perichætal leaves (f. 6), of which there is one pair to each calyx, are ovate, acute, and strongly serrated, having their nerves about one-fourth of their size, oblong, and acute, with revolute and lacinated margins. They are appressed with their inner and beaked surface to the side of the calyx.

Stipites (f. 7, one to each pair of leaves, subquadrate, longer than they are broad, and wider than the stem, to which they are closely appressed. the margins are revolute, the apex emarginate, obtusely for the most part, but, as they approach the calyx (f. 8), they become larger, and more deeply and acutely emarginate, and the extreme or calycine one is bifid, with long, recurved, isolated segments.

Male Fructification situated upon lateral ramuli, as short, that, taken with the perigonial leaves, they are of a roundish figure, lacking in style; the leaves are moreover, so remarkably convex or rather ventricose, that the margins, where they meet on the upper surface, are defined by a deep longitudinal groove or furrow. In each axilla are two or more spherical catkins, in every respect resembling those of *J. dilatata*.

BRITISH JUNGERMANNIÆ.

(J. Tamarici.)

FEMALE FRUCTIFICATION always terminal upon short ramuli.

Calyx (f. f. 8 & 9 10) three-fourths of a line long, obovate, smooth, plane on its upper surface, below projecting with a blunt longitudinal ridge or angle: the mouth is formed by a long and acute tubular point, which divides into four equal segments for the escape of the capsule.

Calyptra (f. 11) obovate, or rather pyriform, yellowish-white, subcarinate, reticulated, tipped with a long style (f. 12), longitudinally and transversely striated; at the apex a little dilated.

Peduncle projecting a very short way beyond the calyx, white, succulent, vascular.

Capule (f. f. 9 10) exactly spherical, of a pale reddish-brown or fawn color, longitudinally furrowed. It divides into four equal, acute, ovate valves. Within, at the base, is seen the orbicular, semipellucid, greyish extremity of the footstalk, around which and upon its margin the valves appear to be situated.

Stems and spiral filaments numerous, fulvous; the former (f. 14) are spherical, minute, tuberculated: the latter (f. 13) composed of a single helix, enveloped in a transparent tube, as is the case in *J. dilatata* and *J. Hutchinsiae*.

J. Tamarici is by no means so common a species as the one last described. It inhabits more exposed situations, and is generally found on the ground, on low bushes, and rocks, most plentiful in healthy and sub-alpine districts: where it forms large straggling patches, conspicuous from their deep reddish-brown or purple color, which, however, it may be remarked, varies to a green in shady situations, and the whole of the under side of the plant, but more especially the auricles and stipules, are generally of a yellowish or brownish-green.

Under the description of *J. dilatata* I have mentioned the characters which will most readily help to distinguish the two species: to these I may add, that the present plant has a more pinnated ramification, and that its calyx is entirely destitute of tubercles. The fertile branches are always short; the perichætal leaves acute, strongly serrated, and, even before the appearance of the calyx, in those ramuli which are destined to produce it, this peculiarity is evident: in this state, however, the auricles do not seem to be so much lacinated (see f. f. 5 & 6). Both is the first person who has remarked this circumstance, and it is from his having done so, as well as from his description of the stipule, that I have been induced to refer his *J. dilatata* to my *Tamarici*. Under the name of *J. tamaricifolia* he seems to have described *dilatata*. Lamarck, in the *Flore Française*, says that this species has "La gaine cylindrique, composée de feuilles dentelées, which is by no means the case, nor have I ever seen the capsule, as he observes, elsewhere." "d'un noir luisant."

Dillenius has well distinguished the habit of this species. "Tenuiores ac longiores," are his words, "ac Lichenastrum caricinum minus, squamis consero-concreto (*J. dilatata*) habet verrucos, Tamarici Narbonensis cum abstinens, magis ramosos et magis liberos, a corticibus et musis, quibus adhaeretur abscedentes, et plerumque pendulos, pluribus sibi incumbenibus, colore in junioribus et non florentibus platis obscure viridi, in florentibus ut plurimum subfuso, rubiginoso, et stro-rubente." I have not observed, however, that the difference in color arises from the age of the plant, or that it depends upon its barren or fertile state.

The male fructification of this species, as well as the last, was found by Mr. Lyell, at the same time and place as is described under *J. dilatata*. I shall, in a future number, have occasion to notice the anthers of *J. platyphylla*, also communicated to me by that gentleman. Except Michell, I am not aware that any writer has taken notice of the male organs of these three species. In his work, the *Genera Plantarum*, they are figured of the natural size in a very satisfactory manner, but in the magnified representation the author has completely failed, and, indeed, does not appear to have seen, in any of the species, the filament of the anther. To those who are acquainted with Michell's system, it will be needless to mention that this acute observer mistook the male fructification for the female; yet the error into which he has fallen has not prevented him from making many interesting discoveries, relative to the fructification of this genus of plants, and such as seem to have escaped the researches of almost every subsequent writer upon the subject.

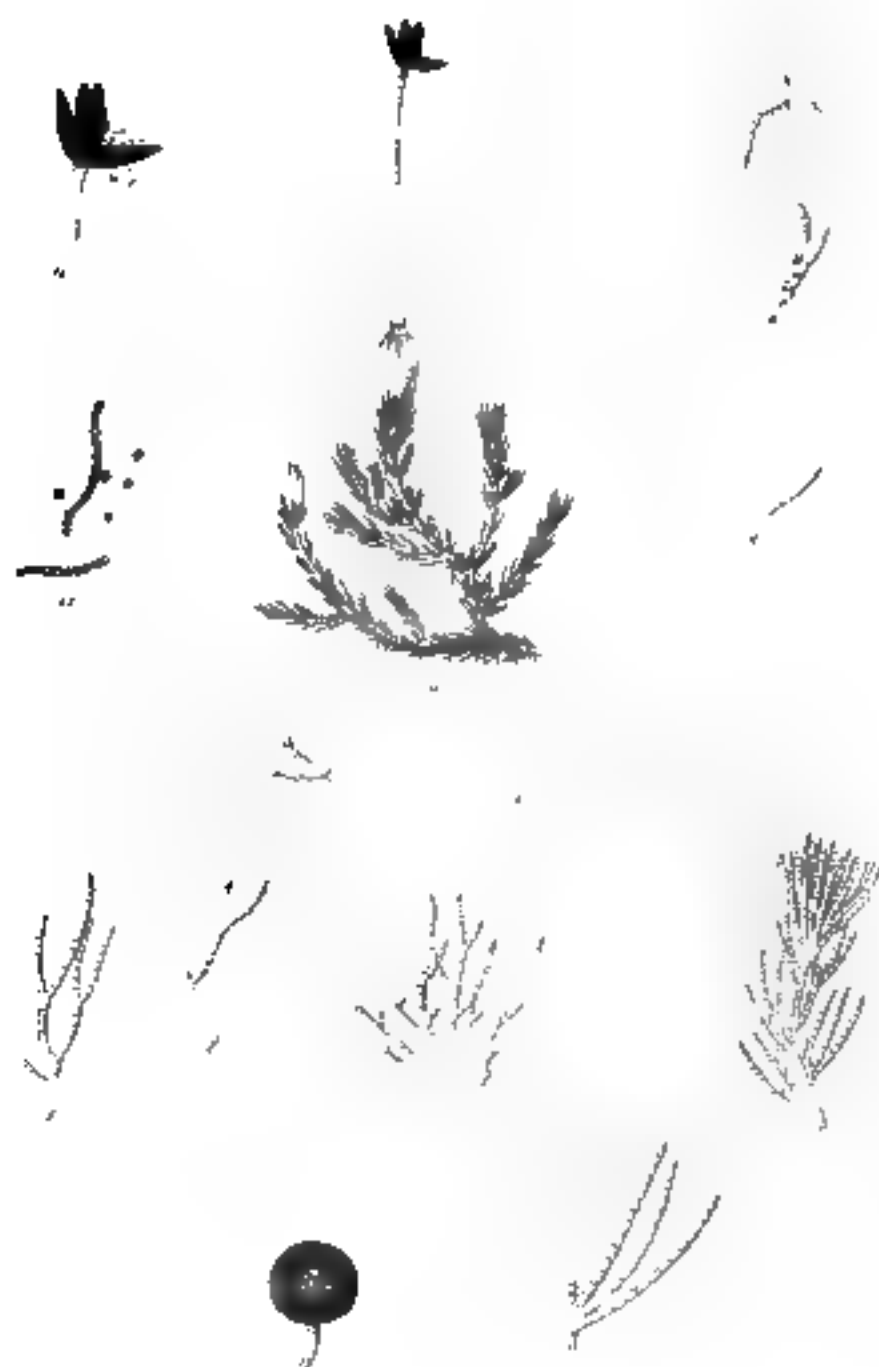
Nocher's *J. rotundifolia*, upon the authority of a specimen which Mr. Turner has received from Dr. Esper, is nothing more than our *J. Tamarisci*.

REFERENCES TO THE PLATE

FIG.

1	<i>J. Tamarisci</i> , barren plant, natural size.	
2	Fertile plant, natural size.	
3	The same magnified	8
4	Portion of a surculus	4
5	Leaf and axicle of a fertile shoot	2
6, 6	Perichætial leaves	2
7	Stipule	2
8	Under side of part of a fertile branch	4
9	Upper side of the same, and capsule	4
10	Calyx, under side	3
11	Calyptra	3
12	Style	1
13	Spiral filaments, each in its tube	1
14	Seeds	1





Jungermannia erichophylla

JUNGERMANNIA TRICHOPHYLLA.

(TAB. VII.)

Jungermannia, surculis repente, vagè ramoso foliis utriusque imbricatis, sic illic fasciculatis, setaceis, articulatim, patentibus, rectis fructu terminall; calycibus oblongis, ore contracto, ciliato.

Jungermannia trichophylla. Linn *Sp. Pl.* ii. p. 1601. *Syst. Nat.* ii. p. 706. SCHREANK, *Boissière Flora*. i. p. 500. SCHREANK, *Spic.* p. 103. HOFFMANN, *Germ.* ii. p. 32. SCHREANK, *Spic.* p. 134. WEIS, *Plant. Crypt.* p. 130. HUDS. *Angl.* p. 516. SCHNIEDL, *Icones*. p. 164. t. 42. OUD. *Enum. Pl. Fl. Dor.* p. 42. WITT III. p. 864. ROSE, *Germ.* i. p. 366. (excl. var. 3.) LINN. *Syst. Nat.* ed. Gmel. ii. p. 1251. LAMARCK, *Encycl.* i. p. 283. *Engl. Bot.* i. 2252. LAMARCK, *Fl. Fr.* ed. 2. ii. p. 437.

Musci Lichenoides capillaris et veluti crispulosi. ROSE Jan. i. p. 344. ii. p. 293. (sic Dillen.)

Lichenastrum trichodes, capitulis folliculis, e summitate ramulorum egredientibus, inclatis. DILL. *Gloss.* p. 212.

Lichenastrum trichodes minimum, in extremitate ferens. DILL. *Musc.* t. 73. f. 37.

Jungermannia minima, foliis capillariter multifidis. HALL. *Helm.* iii. p. 63.

HAB. Turfy heaths, near North Brierly, Yorkshire. Mr. Richardson.—On Craigallach and Schochallion, in Breadalbane, Perthshire; and on Ben Loyal, in the North of Sutherland.—About Bantry, Ireland. Miss Hutchins.—Near Belfast. Mr. Templeton.

PLANT growing in loosely-matted tufts, of some inches in diameter.

Root consisting of minute whitish fibres, proceeding here and there from the under side of the surculus.

Surculi creeping, from half an inch to an inch and a half in length, their thickness scarcely exceeding that of the human hair, sometimes simple, but mostly once or twice forked, the shoots beset with short, scattered, patent branches, which are often again divided.

Leaves growing in alternate clusters, each at a small distance from the other, so that the surculus is every where visible. these clusters* are composed of two or more, frequently three, but occasionally of five and proceed from every side of the plant, particularly near the apices, where they form tufts or penicils (f. 3, but, when the plant is closely attached to the ground, the under side is bare of leaves, and, in such cases, those which originate from the other parts of the surculus have a spread appearance. the whole are erecto-patent, setaceous, straight, scarcely the eighth of a line long, of a yellowish-green† color, paler when dry; generally simple, but occasionally forked, or even branched (f. f. 5 5), which is more particularly the case with those which form the terminal tufts. all of them are divided throughout their whole length with transverse dissepiments, forming joints, which are a little longer than they are broad, and perfectly cylindrical; when dry they are frequently alternately contracted in the same manner as the joints of *Coniferus capillaris* of Roth and *Conf. diffusus*, and the coloring matter either contracts into a dark green globule, in the centre of the joint, or is confined to the borders of the dissepiments, at the same time that the other parts of the leaf are quite pellucid.

Of the perichætal leaves (f. 6) the external are similar to those just described, the internal nearly ovate, entire at the base and for about a third of their length, thence cut into many branched capillary segments of various lengths.

MALE FRUCTIFICATION situated in the axille of those leaves which are collected into a tuft at the extremities of the ramuli (f. 3).

Stamens (f. 7) exceedingly minute, spherick, of an olive-green color, externally marked with reticulations, within containing a fine powdery mass, which gives the color to the otherwise transparent pellicle. they are supported upon a white, extremely delicate and pellucid, cylindrical filament, of nearly the length of the globule.

FEMALE FRUCTIFICATION terminal.

Calyx (f. 8) elliptical, inclining to obovate about a half a line long, plicated, contracted at the mouth, where it is fringed with short cilia, which are sometimes bifid. its color is paler than that of the leaves, and more inclining to yellow, it is somewhat transparent, and its whole substance a tissue of small, oblong, compact cells.

Corolla ovate, very thin and delicate, reticulated, nearly white, tipped with a short style. *Stovaria pistilla* lanceo-lanceolate.

Pedicels about a quarter of an inch long, pallid, white, callous.

Capsule at first ovate, in maturity splitting into four equal, lanceolate segments, of a dark reddish-brown color, longitudinally and transversely furrowed.

* Schmidt says that the leaves are not always regularly clustered, for that an intermediate single one is occasionally to be found; and Roth goes further, and observes of the plant, that, "variet foliis, hoc rarius, videris." Of these I have seen no instances.

† Dr. Roth describes a variety met him by Traupel of a dusky-green color.

BRITISH JUNGERMANNIÆ.

(*J. trichophylla*.)

Seeds and spiral filaments fulvous, the former nearly spherical and smooth, the latter composed of a double helix, continuing to adhere to the margins of the valves of the capsule (according to Schmidel) in a pectinated manner, as in *J. setacea*, *Sarcopeltis*, and others.

Ova. In the middle of summer, or in autumn, if the weather was dry, Schmidel remarked at the extremity of the branches and in the bosom of the terminal leaves or on the spines, minute, globular, sessile, semi-transparent bodies, of the color of honey, which in a few days dimbled and totally disappeared. These, from their being seen at the same time with the young calyxes, he was led to consider as the male fructification, a thing that it is scarcely necessary to say he would not have done, had he seen the anthers here figured. I entertain little doubt of what he describes being *Gemmae*, such as are found in the *Morchastia* and in other *Jungermannia*, also, in which both the male and female fruit are present.

Although, from the history of this elegant species of *Jungermannia* given by Schmidel, it appears to be widely scattered throughout Europe, being found from the Alps of Lapland to the Apennines, and covering in Germany whole rocks, yet, in Britain, it seems to be of rare occurrence, having been entirely overlooked in this country till the time of Hudson, who first published it in his *Flore Anglica*, upon the authority of specimens gathered in Yorkshire by Mr Richardson. Since that period, however, it has been met with both in Scotland and Ireland, and from the latter country alone I have received two specimens in fructification, gathered by Miss Hutchins. Roth's var 3 of this species I have ventured to make a synonym to the following, *J. setacea*. The leaves described in this place, as well as by all preceding writers, as simple and clustered, might perhaps, with more propriety, both in this and the following species, be considered as single and cleft to the very base into a number of segments, an opinion which is strengthened by the peculiar structure of the perichetral leaves for these appear to be composed of a number of entire ones connected below, and having as many incisures as there are leaves united. Dr Smith has happily remarked that this species, in a dry state, is distinguished from the mosses among which it grows by its mucor-like appearance, arising from the minute capillary or setaceous leaves in the form of these it agrees with no other British species of *Jungermannia*, except *J. setacea*, under the description of which will be found the characters that more particularly distinguish them.

Schmidel says that the female fructification is uncertain in point of situation, and he both figures and describes some calyxes as growing on the middle of the surculus. I have in vain examined a great many specimens to see any thing similar, and I am led to suspect that he must either have confounded *J. trichophylla* and *setacea* together (which, from the pinnated ramification of some of his unenlarged figures, I still more incline to think the case), or that what he saw were old calyxes, originally terminal, but then appearing lateral, on account of the elongation of a shoot, as I have myself not unfrequently remarked.

REFERENCES

REFERENCES TO THE PLATE.

No.	Part	Fig.
1, 1	<i>J. triobovata</i> natural size.	
2.	Portion of a female plant, magnified	6
3.	Portion of a staminate, bearing anther	6
4.	Leaves	4
5, 5.	Terminal leaves	4
6.	Perichartal leaf	4
7	Anthera	1
8.	Calyx	6
9.	Abortion pistilla	1
10.	Capsule discharging its seeds	3
11	Seeds and spiral filaments	1





Jungermannia ulacea

JUNGERMANNIA SETACEA

(TAB. VIII)

Jungermannia, strobulo reptante, pinnetto ramoso foliis undique imbricatis, bina, setacea, articulatis, patentibus, lacurvis fructu terminali; calycibus oblongis, ore aperto, ciliato.

Jungermannia setacea. WESSER, Spizel. p. 133.

Jungermannia multiflora. HUDS. Angl. p. 510. LAMM Mont. p. 310. POLLOCK, Faint III, p. 102. OXF. Enum. Pl. Fl. Dan. p. 43. LAMM Syst. Nat. ed. GMEL. II. p. 1450. LAMOUR, Encycl. Bot. II. p. 282. WIRTH. III. p. 858.

Jungermannia ovalisquandea. LAMM Suppl. p. 449. Meth. Musc. p. 116. t. 4. f. 6. MICHAUX, Bot. Am. II. p. 378.

Jungermannia pauciflora. DICKSON, Crypt. Fasc. II. p. 15. t. 5. f. 9. LAMM Syst. Nat. ed. GMEL. II. p. 1349.

Jungermannia trichophylla, var. 3. ROTH, Germ. I. t. p. 368.

Lichenantrum vestiflorum exilis, foliis angustissimis DILL. Musc. I. 69. f. 4. a. b. ?

HAB. Near Croydon. Mr. DICKSON.—Holt Bog, among *Sphagnum capitifolium*. REE, R. B. Francis.—Mountains adjoining Lough Bray, near Dublin. Mr. D. TURNER.—Bog, near Bantry. Miss HUTCHINS.—Bogs at Westleton, Suffolk.

PLANT sometimes forming dense tufts, but frequently growing almost singly in thick beds of *Sphagnum*, among which it is not uncommonly met with, drawn up, and affecting the same mode of growth as the moss.

Root a few minute, whitish, simple radicles, proceeding from nearly the whole length of the under side of the plant, especially near its base.

Strobili varying exceedingly in length, from two or three lines to nearly two inches, or even more, scarcely so thick as the human hair, creeping, generally once or twice irregularly forked, with segments of uncertain length, and irregularly pinnated with rather distant, short, patent branches.

Leaves rarely single, generally growing in pairs (f. 6), and sometimes, though seldom, three together (f. 7). placed at short distances from each other on every side of the plant, very minute, so that their form is imperceptible to the naked eye, not being much more than the twentieth of a line long; under a microscope they are found to

be tetragons, patent, incurved, furnished, as in *J. trichophylla*, with transverse dissepiments, which form points rather longer than broad, a little swollen in the middle, and often also divided by longitudinal septa, in a manner similar to that of the plates forming the division of the *Coniferæ*, which Mr. Dillwyn has called "longitudinaliter venosæ." These dissepiments are visible also in the younger branches, but the old ones want them, and have the common cellular appearance of the genus. The color of the leaves, and, indeed, of the whole plant, is generally a pale yellowish green, darker, and even of an olive brown, when it grows in very shaded situations. In drying, the same disposition of the coloring matter appears as in *J. trichophylla*, and the leaves become much more incurved.

Perigonal leaves so thickly clustered upon short branches as to form a little spherical ball, very evident even to the naked eye. The *exterior* are for the most part simple, the *interior* from a broad and expanded base, become, at the extremity, divided into a number of narrow lacine of uncertain length: all of them incurved and lying closely imbricated over each other.

Perichætes leaves (f. 8. 8.) equalling half the length of the calyx, in which they are closely appressed: all of them oblongo-ovate and divided nearly to their base into several narrow, whitish, and sometimes branching lacine.

The *Male Frustrification*, which I have received from Mr. Lyell since the engraving of the plate was completed, differs from that of *J. trichophylla* in being situated upon extremely short lateral ramuli. The *stachææ* arise from the axilla of the perigonal leaves. They are extremely small, ovate approaching to round, when perfect of an olive-green color. The footstalk is about the length of the anther, white, pubescent, having numerous transverse septa, which are very evident under a high power of the microscope.

Female Frustrification lateral, sessile, or supported upon a very short footstalk.

Calyx (f. 9.) very small, scarcely exceeding a quarter of a line in length, narrow at the base, then cylindrical: very pubescent, almost white, of an extremely thin and delicate texture, marked all over with oblong reticulations, which are large in proportion to the size of the calyx. The mouth is not at all contracted, but of the same width as the rest, cut into numerous long erect cilia.

Colyptra (f. 10.) ovate, white, thin and delicate, marked with roundish reticulations; at the base surrounded by five or six almost linear, greyish, obsolete papille.

Podocela rather more than a quarter of an inch long, pubescent, delicate, vacuolose.

Capsule ovate, deep brown, opening into four equal, ovate-lanceolate, transversely and longitudinally furrowed valves.

Sede and spiral filaments (f. 11), both of them in every respect resembling those of *J. trichophylla*: many of the latter continue to adhere in a similar manner to the margin of the valves of the capsule (f. 12), a circumstance not uncommonly observable in many species of this genus.

BRITISH JUNGERMANNIE.

(J. nitens.)

On in the month of February I have found *Gemma* abundantly scattered among the terminal leaves, minute, variously shaped, but always more or less angular (E b), pellucid, of a pale greenish color, inclining to brown.

Few *Jungermannia* seem to have been less understood by Cryptogamic Botanists than the present, which is not surprising, if we consider the great similarity that exists between it and *J. trichophylla*, especially in barren specimens. In both cases the most obviously distinguishing characters are its shorter leaves, placed more distantly and in pairs, and strikingly incurved, so that the plant altogether wants the moss-like appearance, pointed out by Dr Smith as characteristic of the other species. But most of these circumstances are liable to some variation in different situations. In fertile specimens, indeed, no difficulty will be found to occur: the extremely delicate cilia, its lateral situation, and its long pedicel being remarkable on the slightest examination with the microscope.

The specific name of *multiflora* was, in all probability, imposed upon this plant by Hudson, in consequence of the numerous footstalks represented in the Dillenian figure here quoted, and has in point of priority a right to be retained, but as not only that engraving (although cited by Hudson and Landerer), but also the original drawing in Mr Joseph Banks' library are extremely unlike our present plant, and especially as this species, in consequence of the paucity of its flowers, has been thought by another eminent botanist deserving of a name directly the reverse to its meaning, that of *J. pauciflora*, I have considered it best to do away an appellation which can only tend to mislead, and to substitute in its room the very appropriate one adopted by Weber. It is, indeed, merely in compliance with the opinion of preceding botanists, and contrary to my own, that I have refer to the Dillenian figure which appears most like a very common appearance of *J. bicuspidata*, and was considered by Weber as so doubtful, that he quotes it under *J. nitens* with a mark of uncertainty. I was in hopes of ascertaining the fact by examining the specimens corresponding with the number in the Dillenian *Methodicum*, but, to my great disappointment, what is there preserved is an injured parcel of *J. communis* Dirch, a plant to which neither the figure nor description have the smallest resemblance. It appears to admit of no doubt but that Dr Roth, who is in general most accurate, and many other botanists, have confounded this species with *J. trichophylla*; and even the acute Elmhart who, by his close attention to the genus *Jungermannia*, has added several new species to the catalogue, and assisted our investigation with many interesting observations on their structure, at the same time that he seems to have known the present plant under the name of *multiflora*, was not conscious of the difference between it and *J. trichophylla*. He has consequently fallen into an error in his *Botanog.* which renders his former remark on the Swedish botanists in that place (he has exemplified "*J. trichophylla* Linn. Sp. (he says)*") *J. multiflora* Linn. Mont. and *J. serrularioides* Linn. Sn. Moth. are all three one and the same plant, whatever may be said against it. But is it not singular that the Swedes, who would wish to lead it over the whole vegetable kingdom, and over the botanists of all parts of the world, do not know the plants of their own country?"

* Botanog. n. p. 68.

I have quoted under this, rather than under *J. trichophylla*, *J. verticillatoides* of the *Methodus Muscorum*, on account of the lateral calyces, although the author has remarked "a *J. setacea* WAB. (*multiflora* DRILL. et LINN.) differt foliis capillaceis, aequalibus, articulatis." The leaves, however, of both the one and other are rather setaceous than capillary. The same observation is equally applicable to the synonym of Michaux, as, indeed, must be the case with almost every author, who attempts to describe these minute vegetables within the compass of a few words or sentences.

The leaves of this *Jungermannia*, though not in reality verticillate, have the appearance of being so, from the circumstance of their growing on all sides of the surculus, and the general resemblance of both *J. setacea* and *J. trichophylla*, under the microscope, to *Conferia verticillata* is worthy of remark.

REFERENCES TO THE PLATE.

FIG.

- | | |
|--|---|
| 1. <i>J. setacea</i> , fertile specimen, natural size. | |
| 2, 3. Barren plants, natural size | |
| 4. Portion of a female plant, magnified | 6 |
| 5. Portion of a ramulus bearing gemmae | 5 |
| 6, 7. Leaves | 4 |
| 8. Perichæcial leaves | 4 |
| 9. Calyx | 6 |
| 10. Calyptra | 3 |
| 11. Calyptra discharging its seeds, and filaments | 2 |
| 12. Seeds and spiral filaments | 1 |





Jungetmannia arvensis

JUNGERMANNIA EXCISA

(TAB. IX.)

JUNGERMANNIA, caule prostrato, simpliciaesulis. Folis patentibus, subquadratis, profunde emarginatis fructu terminali, calycibus oblongis, albidis, ore plicato, dentatis.

Jungermannia excisa. Dicks. Crypt. Flor. iii. p. 11 t. 3. f. 7. Wurm iii. p. 661. HORT. MANU, Germ. ii. p. 92.

Jungermannia globulifera. Roth, Germ. ii. p. 373?

β. ciliolata, foliis longitudinaliter undulatis, segmentis inæqualibus, crispatis.

HAB. In most shady woods. Mr. Dickson. — On Hail and Edgefield Heaths, in wet places, plentiful. Rev. R. B. Francis. — Abundant upon Moushold Heath, near Norwich, and on hedge-banks and heathy places, near Yarmouth. — On the highland mountains of Scotland. — *β* is not uncommon in similar situations with *α*.

This minute PLANT is found in scattered patches, sometimes covering several inches of surface, firmly adhering to the soil by means of the numerous, simple, pellucid, fibrous radicles.

The Stems, which are usually dark green, though sometimes inclining to deep brown or black, vary considerably in their extent, from half a line to five or six times that length, and are about the tenth of a line in diameter, throughout cylindrical, simple, or here and there producing a lateral shoot.

Leaves (f. 4, 5) a quarter of a line long, rather closely placed, patent or horizontal, (erect in var. *β*), subquadrate, approaching to orbicular, slightly concave, semi-plexicaul at the base, at the extremity deeply emarginate, with an obtuse sinus, the segments acute, strait, and equal in size: the color is rather a deep green; the reticulation small, and formed by tubules of a reniform figure.

The perichætal leaves (f. 6) differ from the rest only in being most frequently tridentate.

MALE FRUCTIFICATION I have not been able to discover.

FEMALE FRUCTIFICATION terminal, most abundant upon such plants as are going into a state of decay.

Calyx (f. f. 3 7) nearly a line long and three-tenths of a line in diameter, oblong, cylindrical at the base, above longitudinally plicate, the mouth scarcely at all contracted. Color a very pale whitish green, diaphanous and scarious at the extremity near the middle it is frequently marked with a faint purple ring, which sometimes, and more especially in alpine regions, is seen to tinge nearly the whole of the calyx.

Calyptra (f. 10) ovate, pallid, whitish, reticulated, style short. A few linear-lanceolate sterile pistilla surround the germen (f. f. 8. 9).

Peduncle a line or a line and a half long, white, succulent, cellulose, terminated by the ovato-subrotund, deep brown

Ovule, which divides into four equal ovate valves.

Seeds and spiral filaments red brown, the former exactly spherical, the latter composed of a double helix.

In the var. β . (f. 11, 12) the leaves are almost constantly erect, more crowded, longitudinally undulated and plicate, with the segments of unequal size, curled and distorted.

J. erecta, which was first noticed by our excellent cryptogamist, Mr. Dickson, seems to be by no means of rare occurrence in this country, and during the season of fructification is rendered more conspicuous by the large diaphanous calyx than by the foliage. The purple tinge is most frequent in exposed situations, but is often altogether wanting. The form and size of the calyx (in proportion to that of the plant itself), afford the most striking marks of distinction between this and small specimens of *J. vesiculosæ*. For, in the leaves, I am unable to point out any marks of separation. From *J. inclas*, indeed, with which it accords in size and general habit, the shape of the leaves will furnish a sufficient difference, although Hoffmann, in his *Flora Germanica* seems to have confounded the two at least he applies to the stems of this species the words "apice ferrugineo" and in another place he describes them as "subcompressæ", peculiarities which are remarkable in *J. inclas*, but, not that I have ever observed, in the present plant. Roth has, with a mark of interrogation, quoted Hoffmann's synonym to his *J. byraces*, (has which no two plants can be more unlike. The same author appears to have united with his *J. globulifera* not only Mr. Dickson's *J. vesiculosa*, and Schindler's *J. erecta*, but, judging from some part of his description, the present is also included in the number. His character of the calyx, which, however, has not appeared to me, in any part of it, to be constantly absolutely triangular, in other respects so well accords with this species, that I shall transcribe his words, "Calyx pallidè viridè, plicatus, obsolete triangular, ex oblongo ovatus, ultra lineam, fere æquilongum longus, apice truncatus, albidus, membranaceus, laciniatus, prius infusus in cuspide acutè, tunc super in caliculis centralibus terminalis, quorum longitudinem non raro exsertit."

REFERENCES

BRITISH JUNGERMANNIE.

(*J. erecta*.)

REFERENCES TO THE PLATE.

FIG.

1. Female plant of *J. erecta*, natural size.
2. *Vitr. β* natural size.
3. Female plant, magnified + + + + + 6
4. Portion of the stem and leaves + + + + + 4
5. Leaf + + + + + 2
6. Perichetial leaf + + + + + 4
7. Longitudinal section of the calyx + + + + + 4
8. Receptacle, with the germs and barren pistills + + + + + 3
9. Barren pistillum + + + + + 1
10. Calyptra + + + + + 2
11. *Var. β.* + + + + + 6
12. Leaf of *var. β.* + + + + + 2



Saururus micranthus

JUNGERMANNIA INCISA.

(TAB. X.)

JUNGERMANNIA, caule prostrato, depresso, simpliciscapulo, foliis subquadratis undulatis, subtrifidis, segmentis inaequalibus, hinc libe denticulatis fructu terminali, calycibus ciliatis, ore contracto, lacerto.

Jungermannia incisa. SCHRADE, *Saxif.* ii. p. 5. *Roem. Germ.* i. p. 381

Jungermannia foliis lacris, multidentatis, sessilibus. HALL *Hist.* iii. p. 69. n. 1862.

HAB. Holt Lane and Edgefield Heath, *Rev. R. & Francis.*—Herringfleet, near Yarmouth.
Mr. D. Turner.—Rocky places upon Ingleborough, Yorkshire.—Near Bantry, Ireland.
Miss Hutchins.—Lambeg Bog, Ireland. *Mr. Templeton.*—Found in fructification near Croydon, Surrey, in July, 1811, by *Mr. Dickson.*—Bogs, Westleton, Suffolk.—(It delights chiefly in moist places, and is often found among *Sphagnum* and other mosses.)

PLANT forming small, but very dense patches of a pale green color, the surface appearing exceedingly beautiful from the numerous crisped and dentated leaves, resembling in miniature a tuft of lettuces. It firmly attaches itself to the ground or moss upon which it grows by means of its abundant fibrous radicles, which proceed from the whole length of the under side of the stem, and are much entangled and matted together.

The **stems**, which are prostrate, about a quarter of an inch long, and cylindrical at the base, gradually become wider towards the extremity, where they are depressed, and equal the sixth of a line in diameter, in general they are quite simple, though sometimes furnished with a small ramulus: their color is a very pale and pleasant green.

Leaves (*f. f. 3. 5. 11*) at the base of the stem rather distantly placed, the rest more approximated, at the extremity of the barren plants frequently forming thick tufts or heads; they are subquadrata, longitudinally undulated, at the base semi-amplexicaul and decurrent, the anterior margin a little involute, the apex tri or quadridentate; but here and there a lower leaf (*f. 6*) is seen to be only emarginate: the segments are of unequal sizes, crisped and distorted; their margins very frequently dentate with one or two small teeth. The color of the leaf is an extremely pale green, approaching that of *J. tenuicella*. The *reticulatus* (*f. 14*) is pellucid, the reticles opaque, roundish.

(*J. incisa*.)

BRITISH JUNGERMANNIÆ.

The *perichætal leaves* (L 7) are trifid or quadrifid, the segments more equal in size than those of the cauline leaves, and more frequently and regularly denticulate.

Male FERTILIZATION I have never seen.

FEMALE FERTILIZATION terminal upon the stems.

Calyx (L 8) obovate, about half a line long, and pilose: towards the extremity the mouth is contracted, small and toothed or incised. In color and texture it exactly resembles the leaves.

Calyptra obovate, whitish, reticulated, terminated by a short tubular style.

Peduncle scarcely measuring twice the length of the calyx, white and cellulosæ.

Capsule, seeds, and spiral filaments exactly as in *J. exilis*.

Obs. Upon the terminal leaves of this *Jungermannia*, towards the latter end of December, are situated *Gemmae* (L f. 10. 11. 12. 13) collected together in a small, pale, yellowish-green, spherical mass; but in the middle of January they are, for the most part, dispersed about the plant in the form of a minute powder. Each particle is semi-transparent, and under a microscope appears somewhat spherical in its outline, but beset with a number of acute, projecting angles (L 13).

Haller is the first author who seems to have noticed this species, to which the name of *fecosa* was applied by Schrader in his *Systematische Sammlung Kryptogamischer Gewächse* in the year 1796. In the British dominions it has for many years been known to Mr Francis as an inhabitant of heathy places in the neighborhood of Holt, and this gentleman has long preserved among his manuscripts a figure and description of it, under the appellation of *J. depressa*. Subsequent to its discovery by Mr Francis it has been ascertained to be also a native of Ireland and Yorkshire, and during the last summer, 1811, when the engraving of the plate was completed, ripe capsules were brought to me by Mr Dickson, which he had been fortunate enough to find near Croydon, in Surrey. *Jungermannia exilis* as has been already remarked, bears the greatest affinity with the present plant, but the undulate and almost universally tridentate leaves, together with the compressed stem, are circumstances which will readily distinguish *J. incisa* from that, as well as from every other species of the genus.

Dr Roth's description of *J. incisa* accords so well with our British plant that I feel no hesitation in adopting his synonymy, but he appears to have fallen into a strange mistake, when he says, 'Hinc (*J. incisa*) proxime accedit, nil eadem sit, '*Jungermannia lacunosa* fronde simpliciter pinatâ, foliis bidentatis, floribus pilosis. SCHWABER, Icon. et Anal. pr. tab. 64 f. 1. Habitus totius plantæ sæpe idem cum nostrâ, quævis folia constantè bisecta disantur, quæ in nostrâ regionis plantis nunc hi nunc et plerumque trifida observantur!'" In another place the same author expresses a doubt whether *J. incisa* be really distinct from his *J. globulifera*, a species, which, as has been observed elsewhere, appears to me to include *J. exilis*, *J. umbellata*, and *J. stricta*.

REFERENCES TO THE PLATE.

110.		
1.	<i>J. incisa</i> , natural size.	
2.	Barren plant of the same, magnified	6
3.	Fertile plant	6
4.	Portion of stem and leaves	4
4 ^b	Ditto	3
5.	Single leaf	3
6.	Lower leaf	3
7, 7	Perichætidial leaves	3
8.	Longitudinal section of a calyx	3
9.	Barren plantlets	1
10.	Plant with the gemmae	6
11.	A leaf with gemmae	3
12.	Gemmae in their most perfect state, before dispersion, collected into a spherical mass	2
13.	Gemmae when dispersed	1





Jungermannia bicuspidata

JUNGERMANNIA BICUSPIDATA.

(TAB. XI.)

JUNGERMANNIA, caule prostrato, sericeo, stellatim ramoso; foliis subquadratis, incis, segmentis acutis. Fructu radicali, calycibus oblongis, pilosis, ore dentato.

Jungermannia bicuspidata. Linn. Sp. Pl. ii. p. 1389. Syst. Nat. ii. p. 706. POLLICH, Pal. iii. p. 282. LAMARCK, Herb. p. 350. ALLIOTT, Fl. Ped. ii. p. 312. WALT, Plant. Crypt. p. 117. WESSER, Spic. Fl. Ger. p. 136. WILLD. Bot. p. 341. OEDER, Enum. Pl. Fl. Don. p. 41. SCHREBER, Spic. Fl. Lips. p. 105. ROTH, Germ. iii. p. 384. (excl. syn. Web. Michel, Lapp. et Dill. t. 31. f. 6.) HOFFMANN, Germ. ii. p. 69. SCHNEIDER, Icones. p. 344. t. 63. SCHMID. Diss. Jung. f. xvi. REICHEN. Cat. p. 439. HUMB. Augl. p. 511. LICHTE. Scot. ii. p. 775. LAMARCK, Encycl. Bot. iii. p. 290. WITT. p. 635. (excl. syn. Engl. Bot.) Linn. Syst. Nat. ed. Gmel. ii. p. 1349. LAMARCK, Fl. Fr. ed. 2. v. ii. p. 429. Engl. Bot. t. 2839. (non t. 291.)

Jungermannia globulifera. POLLICH, Pal. iii. p. 192?

Jungermannia sphaerocephala. ROTH, Germ. i. p. 491.

Jungermannia fusa. SCOP. Carn. ed. 2. n. 1245. (fide ROYEN.)

Jungermannia bicornis. Fl. Don. t. 368. a. (non b.)

Lichenostrom Trichomanes felle, foliis bifidis, minimum. ROTH Syn. p. 113. n. 90.

Jungermannia minima repens, foliis bifidis, vaginis foribus cylindricis. MICHELI, Nov. Gen. p. 9. t. 6. f. 17.

Lichenostrom pinetis acutissimè bifidis, minimum. DILL. Hist. Musc. t. 70. f. 12.

Jungermannia foliis distichis bicuspidatis, summis ramis globuliferis. HALL. Holo. iii. p. 50. 1845.

Jungermannia foliis bifidis ex medio caule crebro furciferis. HALL. Holo. vi. p. 62. 1879.

β. PATENS, foliorum segmentis palmatis.

HAB. Extremely common on moist hedge-banks and on heaths, producing fructification most profusely in the early part of spring.—β in marshy places, growing among *Sphagnum*.

Plant growing in large tufts, loosely attached to the soil by means of the fibrous roots, which proceed from every part of the caudex, but especially towards their base.

Stem (f. 1). Scarcely an inch or an inch and a half long, divided in a somewhat arborescent manner, so that the branches for the most part unite in the centre of the plant. They, however, occasionally throw out other short, scattered, potent branches. All are of a pale green color and semipetiolate, the substance delicate, succulent and composed of large oblong cells.

Leaves (f. 3) rather distantly placed, potent, or sometimes erect, scarcely a quarter of a line in length, oblongo-quadrate, divided for rather more than one third of the way from the extremity, by an acute sinus, into two laminae acute and equal segments, which are new and then a little incurved, and I have in a few instances observed them to be recurved. The color exactly resembles that of the stem, a pale pulchid green. The veins are more approaching to round, forming a large and elegant reticulation, their surface is slightly convex.

The *perichetral leaves* (f. 4) are numerous, and surround the base of the calyx, growing closely imbricated. The interior are the largest, and generally divided into two acute segments: the exterior are frequently trifid, and have their points not uncommonly recurved. They are of a pale whitish-green color.

Male Fecundification at present unknown.

Female Fecundification arising from the base of the caudex, where the radicles are the most numerous.

Calyx (f. 5) situated upon a short proper footstalk, which is covered by the perichetral leaves, a line or a line and a half long, oblong, scarcely at all inclining to ovate, nearly white, scarious, longitudinally plicate, the mouth irregularly dentated. It is elegantly reticulated, and has ovate areolae. These calyces remain long after the decay of the capsule and footstalk, and then become tinged with brown.

Capitate ovate, a thin, delicate, whitish, reticulated membrane, tipped with a short style, having at the base numerous linear-lanceolate, barren pistils (f. 7), which I have seen accompanied by what appears to be an abortive germen (f. 8), ovate, with a truncated base and an acuminate point, throughout of an olive-brown color.

Peduncle three quarters of an inch in length, or sometimes more, white, cellular, terminated by the

Capitate (f. 11) which is oblongo-ovate, dark brown, longitudinally and transversely furrowed.—Shortly after the peduncle has reached its greatest height the four valves of the capsule separate, and the numerous roundish

Seeds are discharged, together with many of the double spiral filaments (f. 9). Some of these, indeed, remain attached to the margin of the laminae valves in a pericardial form, pointing, however, obliquely and forming an acute angle with the valve (v. f. 10) thus they continue till the margins of the valves become revolute, which soon takes place, if the atmosphere is dry. Both seeds and spiral filaments are of a reddish-brown or chocolate color. In the winter season (or in the autumn, more frequently, according to Schmidt), the ends of the caudex of many of the sterile plants become erect, having leaves very distantly placed, especially towards the

BRITISH JUNGERMANNIÆ.

(*J. bracteolata*.)

extremity, in which case the apex itself supports a cluster of Gemmae (f. 11) collected into a spherical mass* of a pale yellow color. These in a few weeks dissolve and disappear. Under a high magnifying power each particle (f. 12) appears semi-transparent, very irregular in its figure, and always more or less angular. These gemmae, which Schmidt has represented less angular than I have ever observed them to be, are regarded by that author as the male fructification.

My Var. β (f. 13) is perhaps scarcely worthy of being noticed as a distinct variety. I found it lengthened out and much exceeding its usual size among *Sphagnum*. The greater number of leaves had the segments divaricating (f. 14, in a manner that appeared rather to arise from accident than to be the natural growth of the plant. In specimens of this kind I remarked gemmae, loosely collected together in the axils of the terminal leaves, which precisely corresponded with those just described as forming a globe at the extremity of the soredia.

Few species of *Jungermannia* are more generally diffused throughout the temperate parts of Europe, than the present. It may be seen in almost every wood, as well as in every moist hedge-bank and damp heath. In the latter situation, especially, its whitish sordid calyces, which are so plentifully produced, may be found at almost all seasons of the year. Its size and color, as well as the situation of the calyx, will prevent its being confounded with *J. lycopreæ*, and there is no other species that I am acquainted with for which it can at any period of its growth be mistaken. I have had occasion to observe, while describing another species (*J. setacea*), that the Dillenian figure (*Hed. Musc. t. 59. f. 4. a. b.*) was probably intended for this plant, though subsequently taken up by Hedera and Linnaeus as a new one, under the name of *multiflora*, and I am happy to add in confirmation of this opinion that of Schmidt, who considers it to be the same as a variety which he had discovered "in qua varicæ satis longi foliis alternis instructi fuerunt, quorum foliorum forma adpressius angusta, et inferiori adno parum conspicuae, vel adeo propinquae, ut per oculis plerumque intuitu potuerint haberi: corallinæ vero considerata, et verris inferiori vix bifida folia et junctura lobulæ ut hæc species habere videtur." It may not be improper here to repeat that neither the *J. multiflora* of Linnaeus (*J. setacea* of this work, nor *J. bracteolata*, in the least accord with the original specimen in the herbarium at Oxford, which is *J. constricta*. The figure, however, is accurately copied from the Dillenian drawing, in the possession of Mr Joseph Banks.

The following observation from so accurate an investigator as Schmidt is too important to be omitted, and, as I have not had the opportunity of confirming the existence of what

* German, collected into a similar mass, and in this manner clustered upon the extremity of the soredia, we find upon *Jungermannia Trichomanes*. From this circumstance I imagine Dr. Roth has been led into an error in quoting as synonymous of this species the figure and description of Michx., p. 8 t. 5 f. 4, and Zell, p. 237 t. 31 f. 8, which evidently belong to *J. Trichomanes*, though the calyx represented by Michx. bears no resemblance to that of either of the plants in question.

he saw, I shall offer no apology for transcribing the whole of his remark. "In varietate hujus (*J. bicuspidata*) mense Novembri et Decembri reperi capitula pulverulenta, quæ, summe sucta, corpuscula oblonga aut obversè ovata loca comprehendit; quæ aliquandis in aquâ relictis figuram mutaverunt in sphericam, et ut distinctè vidi, parvas moleculas subrotundas dimiserunt, non verò magnâ coptâ. Inter alia unum corpusculum post aliquot confinium explosionem solutum est, et formam quædam retinuit. parvam aliquam incensuram (forte ab alio corpusculo profectam), ad latus habens, subitâ autem hoc majus corpusculum in motum actum atque in longum protrusum est, ita ut illud ex foco perderetur, nec amplius reperiretur." *Schmidet, Icones* p. 247.

Haller's description, n. 1865, does not so well agree with our plant as his n. 1878, but he tells us that the former is the same as Schmidet's plant. *Disq. fung.* f. 16.

Elphinst's *J. bicuspidata* (Crypt. 293) which I have never seen, Dr Smith assures us, is a very different plant from the present, and more like that figured in *Kegl. Bot.* t. 281, which I formerly supposed was only a variety of *J. bidentata*, but which I am now inclined to accord with Mr. Francis and Dr Schrader in considering a distinct species, though very closely allied to it. It is *J. heterophylla* of Schrader's *Systematische Sammlung*.

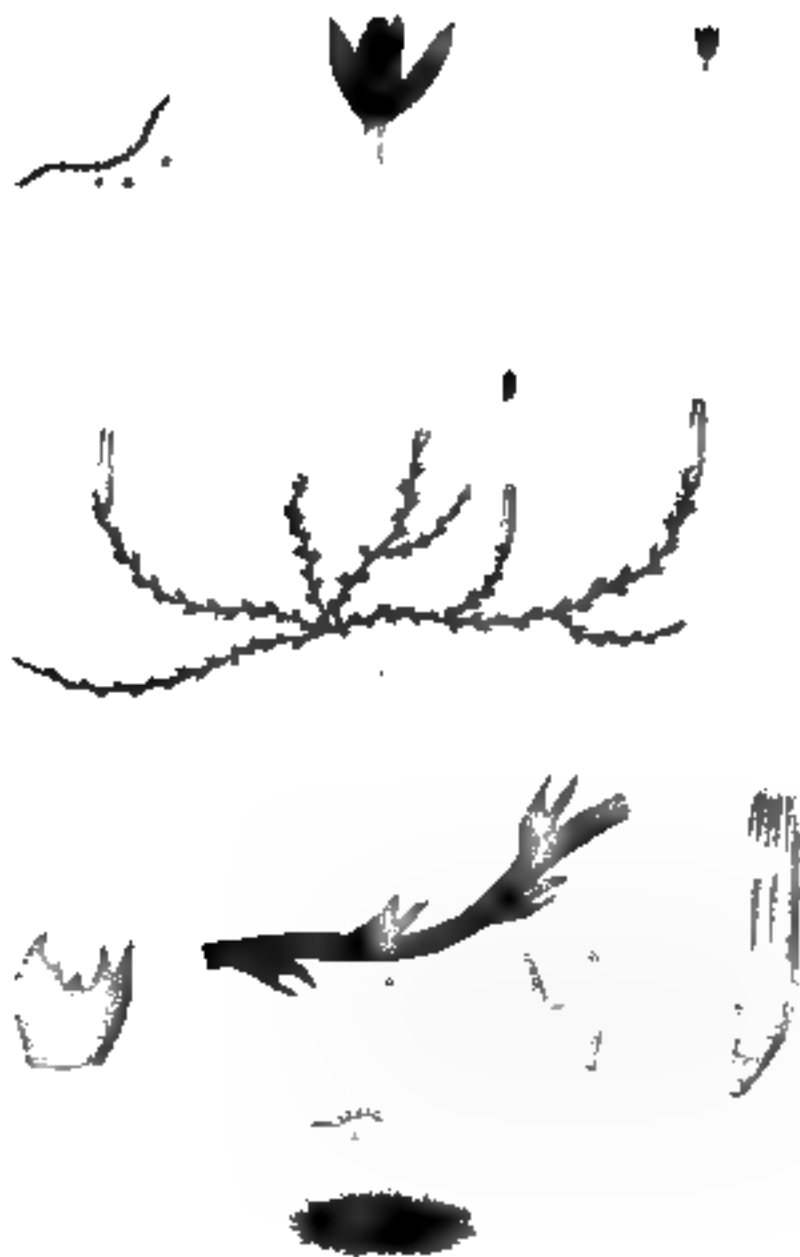
J. bicuspidata, *J. byssacea*, *J. cænitosa*, and *J. curvifolia* form a very natural family, agreeing in general habit and in their ramification, which has always more or less of a stellated appearance, in consequence of the fruit originating from the centre of the plant, and the branches diverging on all sides nearly equally.

REFERENCES TO THE PLATE.

FIG.

1	A style female plant of <i>J. bicuspidata</i> , natural size	
2	The same magnified	6
3	Portion of the stem and leaves	4
4, 4	Exterior and interior perichætal leaves	4
5	Calyx longitudinally dissected	3
6	Aberline germin	2
7	Baryca pistillum	1
8	Capula opening and discharging its seeds	2
9	Seeds and spiræ filaments	1
10	Gemmaferous plant, natural size	
11	Extremity of a circulus of the same, magnified	4
12	Gemma	1
13	Var β, portion of	4
14	Leaf of the same	3
15	Gemma of var. β	1





Sargassum lycopodium

JUNGERMANNIA BYSSACEA.

(TAB. XII.)

JUNGERMANNIA, caeruleo procumbente, flexuosa, stellatim ramosa. Folia subquadrata, laciniis, segmentis acutis. Fructu terminali, calycibus oblongis, pilosis, cym dentato.

Jungermannia byssacea. ROTH, Cat. Bot. II. p. 188. ROTH, Germ. III. p. 587. (incl. *syn. Hoffmanni*.)

Jungermannia bifida. SCHUMBLER, Icones. p. 250. t. 64. f. 2. et 1. 68. f. 2. 19 et 20. (planta gemmifera.)

Jungermannia dicaricata. Eng Bot. t. 719

HAB. First discovered in this country, by the Rev. R. B. Francis, on heathy and exposed situations in the neighborhood of Holt.—Far from uncommon in similar places in various parts of Norfolk and Suffolk.—Mr. Dawson Turner finds it growing in great profusion, but always barren, on the sand-hills at Hemsby, near Yarmouth. Near Duntry in Ireland. *Miss Hutchins.*—About Belfast. *Mr. Templeton.*—On the Scotch mountains, by no means of rare occurrence.

PLANT most frequently growing in dense tufts or pulvilli, conspicuous from their dark green, and frequently almost black color.

The sterculi, which may be reckoned among the smallest of any of the genus, are scarcely so thick as the human hair, and not more than two or three lines in length, throughout filiform, somewhat rigid, branched, like *J. dicaricata*, in a kind of stellated form: the branches often again divided, and procumbent, but the fertile ones pointing upwards at the tips: their color varies from an olive-green to a dark brown, the latter is the most usual appearance.

LEAFER (f. 4) distinctly placed, though occasionally clustered at the extremity of a sterculus, yet in general so small that without great care, even under a microscope, the plant appears almost leafless: they do not exceed the tenth of a line in length, are appressed or patent, subcarnose, in figure nearly quadrate, at the base semisamplexicaul, at the extremity divided for about one third of their way by a rather obtuse sinus,

(*J. hyssopus*.)

BRITISH JUNGERMANNIÆ.

the segments are acute, occasionally a little spreading, which induced Dr Smith to adopt, in *English Botany*, Mr. Francis's manuscript name of *dimorpha*. The color of the leaves corresponds with that of the stem, and is equally subject to vary from a dark (for I have seldom seen it of a pale) green to a deep brown when dry the leaves are rigid and brittle. The reticulation is small, formed by subquadrate cells.

Perichætiol leaves (f. 6. 5) numerous, surrounding the base of the calyx, and closely imbricated, subquadrate, approaching to round, the exterior ones for the most part divided by an obtuse sinus into two equal, acute, erect segments, the interior cut into three, four, or five unequal ones they are all of a paler color than the rest of the leaves, but resemble them in the size and form of the cells of which they are composed.

MALE FERTILIZATION, according to Dr. Smith, within the axilla of the terminal tufts of leaves. *Stamens* small, spherick, yellow situated upon short, pellucid footstalks.

FEMALE FERTILIZATION always terminal upon the stems and branches.

Calyx (f. 6) large in proportion to the size of the plant, about a quarter of a line long, oblong, plicate the mouth, which is by no means contracted, is cut into small obtuse teeth. The whole is extremely delicate, appearing like a thin membrane, though under a high power of the microscope the reticulation formed by oblong cells is very apparent. At the base the calyx has generally a faint tinge of green, the extremity is white, and diaphanous.

The *corolla* is ovate, extremely delicate and pellucid.

Peduncle remarkably slender a line or a line and a quarter long, white, cellulose, shining.

Capsule (f. 7, oblongo-ovate, deep red-brown, longitudinally and transversely furrowed.

Seeds and spiral filaments (f. 8) of a reddish-brown, the former perfectly spherical, the latter composed of a double helix.

Obs. The nearly capillary areolæ, in consequence of the minuteness of the leaves, which are scarcely to be distinguished by the naked eye, are compared by Dr. Roth to *Equisetum telmateia*; whence his specific name.

That the present plant is the *J. hyssopus* of Roth I believe there will be found no reason to doubt. Authentic specimens in Dr. Smith's herbarium exactly correspond, and the description in the *Flora Germanica* is excellent. This author justly observes that "*necitate caules ob folia remota contracta quasi pedunculati. et primo intuitu Corolline officinalis ramulum representant.*" I cannot, however coincide with him in considering it a variety of, nor in supposing it has any kind of affinity with, Hoffmann's *J. exilis* which, to judge both from the description and remark at the end of it, is the same species as Mr. Dickson's plant, of the same name. Dr. Roth further

observes that Schumacher's figure of *J. baccapoda* (his *Jung. J. 16*) accurately agrees in the habit and situation of the leaves of *J. hyssopus*, and that he should certainly have quoted it as a synonym, were it not for the gemmiferous globe being there represented as attached upon the extremity of the naked stem, while in the present species it is immersed in tufts (scand. of leaves). To me however it appears that Schumacher's figure just alludes to the intended for the true *baccapoda*, and though I have quoted, should again (fig. 2. p. 6. 21) of that author's *Icones* as the gemmiferous plant of *J. hyssopus* I have much more reason to think it was really intended for this species than the figure in his *Flaunetia* is referred to above. While researching the very interesting plantulae maculosa of *Icones* Schumacheri Jungermanniae *J. scabra* minutissime plantulae globuliferae sive Jungermanniae, cupes folia breviora, et obtusius lanceolata, faciem adpressiorem ex basi tubulari et valentiori petiolo ad Jungermanniam stem. minimum spum. 1. 64. f. 2. petium exhibens. The reference to f. 2. 1. 64. is a still further inducement for me to consider the plant just mentioned as belonging to *Rothia hyssopus*, for although Schumacher was of opinion that the one referred to was probably a variety of his *J. baccapoda*, *J. rubra* Hedl. and notwithstanding some of the lesser parts of the figure more nearly resemble those of *J. scabra*, yet the different shape of the calyx in the flower of these Jungermanniae and the generally simpler mode of growth of the latter led me to being united with it. It is surely not drawn with the great accuracy and minuteness of the author of the *Icones* *Plantarum*, and leaves me so far uncertain as to its identity, that I have not ventured upon the name of *Rothia* which Schimper, the editor of the third fasciculus, has, in a note proposed should be given to it.*

With regard to the situation of the Gemmae upon *J. hyssopus*, it might naturally be expected, from its close affinity with *J. baccapoda*, that they would be found produced in similar spheric clusters and in the same situation as in that species. Such, too, appears to be the case from Schumacher's figure so that in all probability what Roth has found in the clusters of terminal leaves and hooked upon an anagallis (the *anagallis* in *J. baccapoda*, are real anthers, such as are noticed by Dr. Smith in *Enchirid. Bot.* 41).

Affined as this species certainly is to *J. baccapoda*, and slightly as it may appear to be distinguished from it in the specific character, yet it will be found to differ remarkably in its manner and in the remote situation of the leaves, in the hardness of these in proportion to the diameter of the verruculae, in the deeper and broader colour of the whole plant, and more particularly in the calyxes being always terminal upon the anthers, and a these being surrounded at the base by perianthial leaves, which are less deeply divided, and which have segments never that I have been able to discover in the least cruciated.

In their place of growth a difference may be remarked, for while *J. baccapoda* abhors quiet and shady banks or the boggy parts of heaths, *J. hyssopus* is most commonly met with in open and exposed situations in dry foot-paths, and even forming upon sand-hills, blackish patches, visible at some distance from the dark green of the surrounding foliage.

* From the above has been perceived have been derived by M. B. (with a new Benth. species of *Jungermannia*, which agrees in more particulars with the plant figured in Schumacher's 1. 64. p. 1. f. 2. etc. 41. f. 1. 64. *J. hyssopus*, and which I have very good reason to suppose is the same.

REFERENCES

REFERENCES TO THE PLATE.

FIG.

1. A tuft of <i>J. hymenæa</i> , natural size.	
2. A single plant, natural size.	
3. The same magnified	6
4. Portion of the strobilus and leaves	3
5, 6. Perichæcial leaves	2
6. Calyx	2
7. Capsule, after the discharge of the seeds	2
8. Seeds and a spiral filament	1





Funaria asplenoides

JUNGERMANNIA ASPLENOIDES.

(TAB. XIII.)

JUNGERMANNIA, caeruleo ascendente, ramoso foliis obovato-rotundatis, ciliato-dentatis, subrecurvis fructu terminali, lateralique; calycibus oblongis, compressis, obliquis; ore truncato, subciliato.

- Jungermannia asplenoides*. LINN. *Sp. Pl.* ii. p. 1597. *Syst. Nat.* ii. p. 705. POLLICH, *Fal.* iii. p. 174. SCOROLL, *Carn. ed. 2da.* ii. p. 344. LAMOUR, *Morb.* p. 349. SCHRANK, *Bohem. Flor.* ii. p. 494. WEIS, *Plant. Crypt.* p. 110. WAGEL, *Spec. Fl. Göt.* p. 132. WILLD. *Ber.* p. 340. ORDE, *Enum. Pl. Fl. Dan.* p. 41. HEDWIG, *Theoria*, t. 16. et 17. ALLIOT, *Fl. Ped.* ii. p. 311. VILLARI, *Dipla.* ii. p. 992. ROTH, *Germ.* iii. p. 363. HORTMANN, *Germ.* ii. p. 87. REICH, *Cont.* p. 437. *Fl. Dan.* t. 1061. LINNÆ, *Scot.* ii. p. 772. WYTH, iii. p. 852. LINN. *Syst. Nat.* ed. Gmel. ii. p. 1347. LAMARCK, *Esquis. Bot.* iii. p. 278. LAMARCK, *Fl. Fr.* ii. p. 481. LAMARCK, *Fl. Gall.* p. 69. *Engl. Bot.* t. 1061.
- Lichenastrum Trichomanis* fœcis, capitulis & foliis immixtis variegatis, major. REICH, *Syn.* p. 112. n. 15.
- Jungermannia major*, foliis subrotundis, tenuissime denticulatis. MICHAEL, *Nep. Germ.* p. 7. t. 5. f. 1. 2.
- Hepatica asplenoides*, ramosa, major, florida, minor *Nummularia folia*, major. VAILLANT, *Par.* p. 90. n. 10.
- Lichenastrum Asplenii* fœcis, plantis inferioribus. DILL. *Musc.* p. 482. t. 60. f. 6. a. b. c. (each. syn. Mich. t. 5. f. 3.)
- Lichenastrum Asplenis* fœcis, plantis confertioribus. DILL. *Musc.* p. 483. t. 69. f. 6. a. b. c. (each. syn. Vail. *Par.* t. 19. f. 7.)
- Jungermannia foliis pinnatis, subrotundis, sparsis, ex apice floriferis*. HALL. *Held.* ii. p. 60. 1860.

HAB. Frequent in moist woods and shady hedge-banks, producing fructification in the south of England very rarely; in the subalpine countries of the north more frequently and also in Ireland, according to Dr. Steud.

PLANT sometimes growing in dense and nearly erect tufts, but more generally in loose and straggling patches among *Hypnum* and other mosses.

Stipules either erect or procumbent, throwing out a few fibrous radicles from their base, and here and there from the whole extent of their lower surface. About the thickness of common buckthorn, from two to four or five inches in length, flexuose, now and then beset with simple ramuli, or furnished with young shoots, which, in their more advanced period of growth, resemble divisions of the surculi. The color varies from a dull green to a reddish brown. In substance the surculi are firm, but flexible, the cellular very compact.

Leaves from one to two lines in length, alternately placed in two rows on each side of the surculus, often closely arranged towards its extremity. The rest more or less truncate. All of them are horizontal, having the ends slightly recurved, so as to present a convex upper surface. Their base is semamplexicaul, the lower margin very decurrent. In shape the leaves are obovate approaching to round, their margins either entire (*f. 4*) slightly dentate (*f. 3*) or, as is most frequently the case, dentato-ciliate (*f. 5*) and this in so striking a manner as to be often visible to the naked eye. The color is a dull yellowish green. The reticulation small in proportion to the size of the leaf, formed of roundish cellular.

Perigonal scales ten or twelve in number (*f. 1, 3* and *6*), closely imbricated on each side of the surculus and entirely surrounding it. Roundish, concave, ventricose at the base. The margins more or less dentato-ciliate, some of them a little recurved.

Perichetial leaves exactly resembling the cauline ones, only that they have their lateral margins more recurved and often revolute. They are too, erect.

Male fructification in the axils of the perigonal leaves, and sometimes axillated, also, in various parts of the surculus, but more frequently occupying the extremity. The *Anders* (*f. f. 13, 14*) are in clusters of from two to four or five. They are ovate when perfect of a greyish color. I have seen the eyes open, whence the pollen has been discharged, leaving the culm white, prismatic and reticulated. The filament is about half the length of the anther, white, transparent, transversely striated.

Female fructification is terminal upon the surculi and shoots. Occasionally too, lateral, or perhaps, only appearing so in consequence of the production of a shoot inadequately beneath it (*f. 2*).

Calyx (*f. 7*) from two to three lines in length, generally leaning on one side, so as to be somewhat asymmetrical-shaped. The base is almost cylindrical, the mouth truncate, very much compressed (except when forced apart by the capsule and peduncle), the opening extends a little way down on one side of the calyx where, as well as on the whole of the upper margin, it is dentato-ciliate. In color and texture the calyx exactly resembles the leaves.

Calyptra (*f. 8*) obovate, or rather pyriform, tipped with a short style, of a delicate texture, strongly reticulated at the base. It is surrounded by numerous *barren papille*, each of which is linear-lanceolate, longitudinally and transversely striated. The mouth is open and a little expanded.

Peduncle from an inch and a half to two inches long, white, shining, loosely cellulose. It is inserted into the receptacle by means of a fibrous bulb (*f. 10*) of an obconical shape, which is with one drawn out along with the peduncle. A similar cluster

BRITISH JUNGERMANNIÆ.

(*J. asplenoides*.)

of fibres I have remarked upon the peduncles of two or three large exotic species of the genus.

Capsule ovate, dark purplish-brown, approaching to black, opening with four equal imbricate valves, each of which is marked with longitudinal furrows (f. 11).

Seed spherical, reddish-brown spiral filaments of the same color, and formed of a double series (f. 12).

Almost every author has followed Linnæus in making the "*Lichenastrum Asplenii* fœcis, pinis confertioribus" (Hist. Musc. p. 483. 8), a variety of the present plant. Dillenius, who was induced to describe it as a distinct species only out of deference to preceding botanists, remarks "similiora est hæc præcedenti (*J. aspen.*), nec ab eâ distinguitur nisi quod folia densius nascuntur et magis imbricatis invicem imponentur, nervum magis protuberantia, pinarum extremitatibus et margine interiori evidentibus crenatis et quasi spinosis."—These little differences in the leaves are to be found not only upon plants growing in the same patch, but are even to be met with on the same individual, so that I have not thought it proper to retain these even as varieties. The Michelian synonym *Jungermannia major*, foliis densioribus et obtusioribus non dentatis, and that of Vaillant, *Heptacodium Polyptrichi fœcis*, I have excluded from the references here made, because, both from the descriptions and figures of their respective authors, I am led to consider the plant they allude to as *J. polyptricha*, rather than *J. asplenoides*.

This species, though sufficiently well marked to render it needless for me here to point out its distinguishing characters, is, nevertheless, in general habit, in the strong denticulation of the leaves, and more particularly in the circumstance of the opening of the calyx not being confined to its extremity, but continued a little way down on one side, nearly allied to *J. asplenoides*, and it is not improbable but they may hereafter constitute a distinct genus, apart from every British species at least, founded upon characters taken from the form of the calyx. To these, in some respects, Swartz's West Indian *Jungermannia adnata* and *puleia*, bear a considerable affinity; but in both of them the calyx is described as formed "*e foliis cuneatis*," as is the case in *J. juniperis* of Swartz and of this work, in *J. emarginata* of Ehrhart, and in *J. rotunda*, but not in *J. asplenoides*.

The situation of the male flowers in the different species of the genus is well worthy of attention. The present is one of the few species belonging to a division that I am acquainted with, with simple leaves, in which the perigonial leaves take a different form from the rest, and, by their hirsute and closely-imbricated disposition, are rendered conspicuous at first sight. These, however, according to the observations of Radwig, fall off when they are no longer wanted to protect the anthers "*calvus est in cæcis locis, ubi flos fuerit sem tegmina antherarum subinde cadunt, vel consumuntur*." The anthers of *J. asplenoides* have also been seen by M. L. Abbé Haüy, in France, as we learn from the *Encyclopédie Méthodique*. The words of this gentleman are "Cette plante porte sur la partie postérieure de l'extrémité des racines, qui ont pris un certain accroissement, de petits boutons ou des points noirs très-sensibles, portés par des supports de pédicules fort courts et aplatis. Ces points sont

ordinairement au nombre de quatre et disposés en croix." There can be no doubt that what the Abbé has here described are male fructifications, yet I have never myself observed the anthers (*petits bostons*) to be of a black color, nor that they are "*disposés en croix*." I have not yet been fortunate enough to discover the anthers of *J. spinulosa*, but, judging from the similarity that exists in the female fructification of the two plants I am induced to suspect that they will be found to correspond in the male also.

The barren plants of some of the larger species of *Bryum*, as *B. punctatum* and, more especially the trailing surculi of *B. caespitosum*, *B. ligulatum*, and *B. rotundatum*, may occasionally be confounded with this *Jungermannia*, but, besides the different shape of the leaves, the nerve in those of the mosses will at once afford a distinguishing character. From *Hookeria lucens*, with the leaves of which it bears a still greater resemblance, it may always be known by the bifarious, and never trifarious insertion of its leaves, by their rounder figure, and by their strong denticulation. The *Hookeria*, too, has the cells, of which the leaf is composed, much larger, and of a more ovate figure than *J. asplenoides*. Lamarck says of the plant before us, that it has something the habit of *Hypnum adiantoides* (*Fluidens Hedw.*), but is much larger, and has the leaves of a rounder figure; an observation that will scarcely be considered as made with his usual happiness of remark.

The female fructification, which in England is not of frequent occurrence, in France seems to be still more rare, and the authors of the *Flore-Française* observe, that they have never themselves seen it.

Under this species, Weber, in his *Spidlegium Flora Goettingensis*, observes "*Vagina exterior crenata. Interior ovoides, in altera latere apicula infra apicem inserta donata.*" By "*apicula infra apicem*," he probably alludes to the style, which, however, I have always remarked to be exactly terminal.

REFERENCES TO THE PLATE.

FIG.

1. Barren plant of <i>J. asplenoides</i> , natural size.	
2. Female plant, natural size.	
3. Extremity of the surculus of a male plant, magnified	4
4. Portion of the surculus and leaves	4
5. Leaf, seen from behind	4
6. Perigonal leaf	3
7. Calyx and perichætal leaves	4
8. Calyptra	3
9. Barren pistillum	2
10. Lower part of the peduncle, showing the fibrous bulb at its base	2
11. Capsule burst, discharging its seeds and spiral filaments	2
12. Seeds and spiral filaments	1
13. Anthers (the perigonal leaf being removed to exhibit their insertion) . .	2
14. Single anther	2





Jungermannia spirulosa

JUNGERMANNIA SPINULOSA.

(TAB. XIV.)

JUNGERMANNIA, surculi erecto, ramoso: foliis obovatis, recurvatis, hinc margine apiceque denticato-spinulosis; fructu laterali, axillariquo; calycibus subrotundis, compressis; ore truncato ciliato.

Jungermannia spinulosa. DICKS. Crypt. Fasc. II. p. 14. WITT. III. p. 956. LICH. Spel. Nat. ed. Gmel. II. p. 1349.

Jungermannia serrata. ROTH, Cat. Bot. I. p. 144.

Lichenastrum planula alternis, quasi spinosis. DILL. Musc. p. 489. t. 70. f. 16. (sect. sp. MICH.)

Lichenastrum ramosius, foliis trifidis. DILL. Musc. p. 489. t. 70. f. 15.

β. **TRIDENTICULATA**, foliis minoribus, punctatis, apicibus tri-spinosis.

Jungermannia tridenticulata. MICHX. Ber. Am. II. p. 478.

HAB. Wales. *Dillenias*.—On the Scotch Alps. *Mr. Dickson*.—Not uncommon in the mountainous parts of England, Scotland, and Ireland.—β. Mountains near Dentry. *Mrs. Hutchins*.—Cumbria. *Mr. Mackay*.—(The *Calyptra* are, according to Miss Hutchins, to be found at all seasons of the year.)

THE PLANT grows in densely-crowded tufts or patches, of several inches in diameter.

Surculi varying in length from two to five inches: erect, sexuose, rarely simple, for the most part beset with a few scattered, short branches sub-patent and again divided, both the main and secondary branches throwing out annual innovations. The *texture* of the surculi is firm and compact: when dry rigid and brittle: the color in the younger plants, and in the shoots, a dull yellow-green; in the older ones it varies from a yellowish to a reddish-brown.

Leaves (f. 4) a line long, distantly placed in the lower parts of the surculi, at the extremity more generally crowded: in shape they are obovate, having, however, as in *J. apiculoides*, a very decurrent and semi-amplexicaul base, the extremity is more

or less bent back, especially in the young shoots, and, in a dry state, so much so that they often meet behind; the margins too are revolute: of these the lower or anterior one is entire; the apex and upper or posterior margin is cut into many spiniform teeth, which are of unequal sizes, but all very conspicuous to the naked eye. The color of the leaf is a pale yellow-green, inclining to brown, tinged with red at the point of insertion after having been kept some time in the herbarium the whole plant becomes a pale brown. The texture of the leaves is very compact, brittle when dry the reticulated appearance (f 7) is here very obscure, the cellules being small, ovate, and distantly placed, requiring a very high power of the microscope to distinguish them accurately.

The perichætal leaves do not, in the least, differ from the rest.

Male Fructification unknown.

FEMALE FRUCTIFICATION lateral upon the caulis, and frequently arising from the axilla of the branches. I have never seen it absolutely terminal.

Calyx (f. f. 5. 6) a line or rather more in length, rounded at the base, and swelling out a little; at the upper end compressed the mouth is truncate, and dentate-spinulose; the opening, as in the last species, extends a little way down on one side of the calyx.

Barren pistilla (f. 8) eight or ten in number, situated at the bottom of the calyx, linear, of a greyish color, with longitudinal reddish streaks the mouth is a little expanded. I have not seen the fructification, at present in a more advanced state.

Var β . (f. f. 9 10) which has a most elegant appearance, scarcely exceeds an inch in length.

The leaves are throughout very remotely placed, and at the upper extremity are cut sometimes into two, but more generally into three, large and acute teeth.

It is a little remarkable that *J. spinulosa*, which is not only an inhabitant of the alpine regions of Great Britain but of North America, and, as it appears, also, of Surinam*, should be unnoticed by every author on the Continent of Europe. Widely, however, as the plant itself is diffused, no part of the fructification had been known in any country, till Miss Hutchins found specimens in Ireland producing calyxes in profusion. The greater part of these were old, and entirely empty: others had barren pistilla, but none had the fructification further advanced. Calyxes in the same state I have also found in Scotland.

According to the Dillenian herbarium, the two plants above quoted from the *Historia Muscorum* belong undoubtedly to the same species, not affording even sufficient marks to be considered as varieties of each other. The "*Lathrastrum ramosum, foliis tripartitis*" might, indeed, from the description of Dillenius, be supposed to be the same as my Var β , but,

* Dr. Roth found his specimens upon some pieces of the bark of *Quercus coccinea*.

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(*J. spinulosa*.)

although the original specimen at Oxford is much smaller than the representation on the plate, and in that respect approaches more nearly to my variety, yet the leaves are by no means generally tri-spinose on the contrary, by far the greater number are much dentated, and the only difference appears to be, that they have their teeth rather smaller and more numerous than is the case with the common state of the plant.

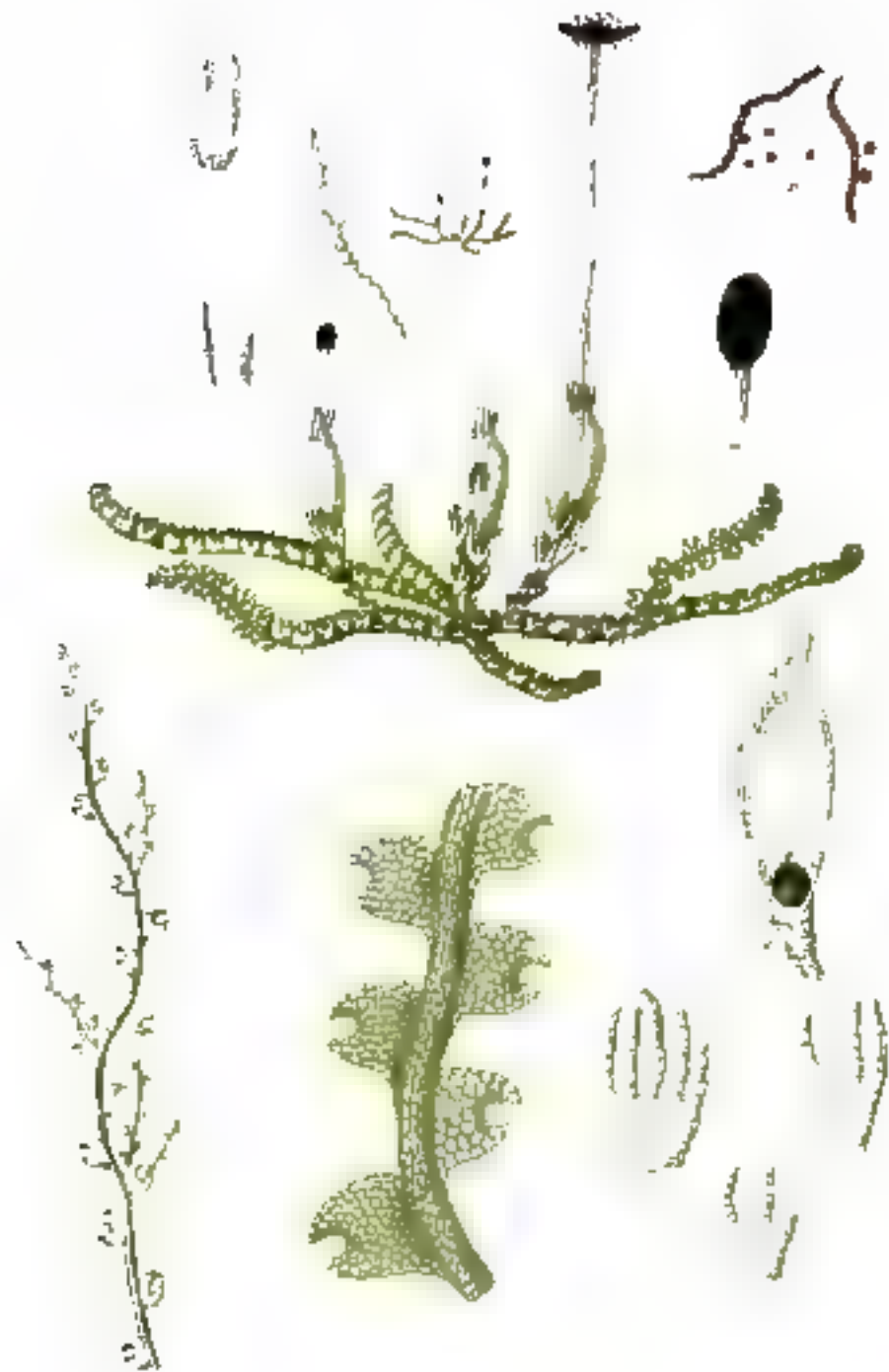
The present species may be considered as one of the largest and handsomest that the genus can boast, whether European or exotic. Its affinity with *J. spinulosa* has been already noticed.

REFERENCES TO THE PLATE.

FIG.

1. Small specimens of *J. spinulosa*, natural size.
2. A larger appearance of the plant with calyxes, natural size.
3. Extremity of the same, magnified 6
4. Portion of the stem and leaves 4
5. Calyx 4
6. Horizontal section, exhibiting the interior of the calyx 3
7. Portion of the calyx, showing its texture, which is exactly the same in the leaves 1
8. Barren pistilla 1
9. Var. β , natural size.
10. Portion of the same, magnified 4





Sargassum muticum

JUNGERMANNIA CONNIVENS.

(TAB. XV.)

JUNGERMANNIA, sarcula procumbente, stellatum ramoso; folia orbicularibus, concavis, apice humiliter-emarginatis fructu in ramis propele, brevissimis, centralibus terminali; calycibus oblongo-ovalis; ore ciliato.

Jungermannia connivens. Dicks. Crypt. Fosc. iv. p. 13. t. 11. f. 15.

Has. In umbrasis humidis. *Mr. Dickson*. L. c.—In boggy places in the neighborhood of Holt and Edgely, Norfolk. *Rev. R. B. Francis*.—At Westleton, Suffolk, among Sphagnum and other mosses.—I have also received specimens gathered by *Mr. Tempest*, near Belfast, and by *Mr. Mackay*, from a marsh in Guanamara.—New Forest, Hants. *Mr. Lyell*.

Obs. The fructification is produced in April, and very profusely in May, according to the observations of *Mr. Lyell*.

This PLANT grows in small and loosely-entangled patches, of a pale yellowish green hue, throwing out here and there, from the whole length of its under surface,

Roots, which consist of minute, whitish, simple and peltoid fibres.

Sarcia filiform, flexuose, procumbent, varying from half an inch to an inch, or even to an inch and half in length; in certain situations, about the twentieth part of a line in diameter. semi-pellucid, cellulose, of a texture equally delicate with that of the leaves. The primary ramification, as in the congeners of this species (*J. lucidata*, *curvifolia*, and *lysiacae*), is disposed in a somewhat stellated form, the branches being often again simply divided by subpatent ramuli, or, as may be seen in f. 3, producing small innovations.

The *Leaves* (f. 5), which have a bifarious insertion, are patent or erect and more or less distantly placed, extremely minute, measuring from the fifteenth to the tenth of a line in length, orbicular, but decurrent at the base, above concave, convex below, cleft at the extremity by an orbicular notch in a very unusual manner, so that the segments are connivens; whence the name. The substance of the leaf appears peculiarly succulent and suberose, the cells large, irregularly subquadrate, their surfaces slightly prominent. The color is a very pale yellowish green.

The *perichætal leaves* (f. 7) vary in number from five to ten, and occupy the short ramuli that support the fruit to the exclusion of such leaves as are produced on the rest of the plant, from which they differ materially in shape; the *exterior ones* being bifid or trifid, with linear-lanceolate and striat segments, the *intermediate ones* more oblong in their figure, with trifid extremities, as in the former, while the *interior* are oblong, divided into four or five linear, erect segments, forming what might be called a *palmate leaf*. The *cellules* of all resemble those of the *caulæ leaves*. The color is somewhat paler.

Male Fructification at present unknown.

Female Fructification supported upon short branches, evidently destined to this sole purpose, which are situated at the base of the *surculi*, and are, consequently, central with regard to the whole plant.

Calyx (f. 6) large in proportion to the size of the plant. I have observed it to be nearly a line in length oblongo-ovate, attenuated at the base, of a whitish color, semi-transparent, elegantly marked with oblong reticulations, formed by the *arrows*, or *cellules*, which are more compact than is the case in the leaves. The mouth of the calyx is contracted, and fringed with five or six erect cilia.

Gynæceum (f. 8) ovate, whitish, reticulated, tipped with a short style, and surrounded at the base by a few

Berres pilulæ (f. 9) of a greyish color, obscurely marked with longitudinal and transverse lines, of which some of the former are of a red color.

Pedicel rather more than a quarter of an inch in length, white, succulent, vasculose.

Capsule (f. 10) ovate, of a deep brown color, evidently, under the higher powers of a microscope, longitudinally and transversely furrowed.

Seeds and spiral filaments (f. 11) a rich chocolate brown; the former spherical, the latter formed of a double helix.

J. communis, though it does not appear to be a very local species, was entirely unnoticed, till Mr. Dickson described it in his valuable publication on British Cryptogamic Botany; nor do I find it has been mentioned by any subsequent author. From Sweden I have received specimens by the kind communications of Dr. Swartz, under the name *J. limosa* var., with the remark "rara species in argilla extensa." Its fructification appears to be extremely rare. I never saw it, except upon a specimen which I found in a boggy part of Holt Wood, in the beginning of April, and upon others which I have received from Mr. Lyell in the present month of May; indeed, at the moment the description is going to the press.

The deeply emarginate leaf, with its rounded sinus and acute marginal segments, not unequalled compared to the form of the new moon, will at all times readily distinguish this species from all the rest of the genus, even if the calyx should not be present which is equally unlike that of any other *Jungermannia*, and is rendered singularly beautiful by the delicacy of its texture (a peculiarity it has in common with every other part of the plant), and by the diluted white.

BRITISH JUNGERMANNIÆ.

(*J. constricta*.)

I have had occasion, in another part of this work, to observe that a specimen of *J. constricta* exists in the Dillenian Herbarium, at Oxford, and is numbered so as to correspond with t. 4. s. 1. 65. of the *Historia Muscorum*, which, however, more nearly resembles *J. incurvata*: though I have in compliance with preceding botanists quoted it, with a mark of doubt, under the description of *J. setacea* (t. v. ii. of this work).

REFERENCES TO THE PLATE

FIG.

1. Fertile plant of *J. constricta*, natural size.
2. Barren specimen, with leaves more distantly placed than usual.
3. Portion of the same, magnified 6
4. Sterile plant 6
5. Smaller portion of a turcular, with leaves. 4
6. Calyx, cut open 4
7. Perichætal leaves 3
8. Calyptra 3
9. Barren pistilla 3
10. Capsule 3
11. Seeds and spiral filaments 1





Jungermannia curisfolia

JUNGERMANNIA CURVIFOLIA.

(TAB. XVI.)

Jungermannia, surculo procumbente, stellatim ramoso foliis subrotundis, valde concavis, bilobis, segmentis acuminatis, incurvatis fructu in ramis propriis brevissimis centralibus terminali, calycibus oblongis, subplicatis, ore dentato.

Jungermannia curvifolia, Dicks. *Crypt. Fasc.* ii. p. 15. t. 5. f. 7. With. (2) p. 664. Linn. *Syst. Nat.* ed. Gmel. ii. p. 1552. Engl. Bot. t. 1304.

HAB. In alpihus scoticis. Mr. Dickson, l. c.—Many places in the ascent to Crib-y-Ddewell, from Llanberris and on the summit of Carnedd Llewelyn, also, near Llyn Llambro, Denbighshire. Mr. Griffith, in *Wick*.—Ugford-Eynon Gars, South Wales. Mr. G. Sowerby.—On decaying wood by a mountain-lake, near Bantry *Moss Fuchsia*.—On Ben Lawers, Ben Nevis, and boggy ground at a place called Ballych-na-craish, in the north-western part of Ross-shire.—Crannies of rocks, Moorne mountains, Ireland. Mr. Teasdale.

PLANT forming small and loosely-entangled patches of a few inches in diameter, and of a deep purple color.

Root consisting of minute, whitish fibres, proceeding here and there from the under side, and most profusely from the lower part of the plant.

Stem scarcely more than half or three-quarters of an inch in length, branching out from a centre in a sort of stellated manner, procumbent, filiform, flexuose, branches simple, or, as is more usually the case, once again divided, their diameter about the twelfth of a line; their color a pale yellow green, purple towards the extremity; their substance delicate, cellulose, flexible, but more rigid and brittle in a dry state.

The leaves (f. f. 4, 5, seem to be for the most part closely placed—they have a bifurcous insertion, though, from their upright position, they have a secund appearance; they are remarkably concave, and measure from the eighth to the fourth of a line in length, those at the extremities of the surculus being the smallest, their shape is round, approaching, however, to ovate—from the apex they are divided about half way down the middle by a rather obtuse sinus, of which the segments are acuminate, and incurved towards the hollow of the leaf in a very striking manner. The reticulation is large, formed by oblong cellules. The color a pale green, changing, in those parts which are most exposed, to a fine purple.

The perichætal leaves (f. f. 6, 7), six or seven in number, resemble the rest in every particular, excepting only that their segments are less acuminate and by no means incurved.

Male Fructification hitherto undiscussed.

FEMALE FRUCTIFICATION arising from the base of the sarcull.—Short ramuli support the

Calycer (f. f. 8, 9) which are oblong or oblongo-ovate, in their color and cellules much resembling the leaves. Towards the apex they are a little plicate, and at the mouth, which is somewhat contracted, are seen a few short teeth.

Calyptra (f. 9) ovate, whitish, reticulated. Style short.

Barræ putilla (f. 10) surrounding the base of the calyptra each is linear-lanceolate longitudinally and transversely striated.

Peduncle half an inch or more in length, of a silvery whiteness, often becoming spirally twisted.

Capule ovate, deep brown, opening into four equal, ovate or oblongo-ovate valves.

The seeds and spiral filaments I have but lately had an opportunity of seeing in a perfect state they exactly resemble those of *J. decuspidata* and *concolorata*.

The natural affinity of this plant with the two species just mentioned is very striking, even to a superficial observer; more particularly to the form of them, from which, however, it essentially differs in the great length and in the incurved segments of the leaves, as well as in the erect (and by no means recurved) apices of the perichætal leaves. The places of growth, too, of the three plants are widely different, the present species seeming to be altogether alpine, and partaking of the rich purple hue which is so common to other plants of the genus in similarly elevated regions.

We owe our first acquaintance with this *Jungermannia*, as well as with the one last described (*J. concolorata*) to the kindness of Mr. Dickson. The figure given in *English Botany* does not exhibit the leaves so much incurved as is the case in my specimens, and, indeed, the whole plant, in that work, appears to bear a nearer approach to *J. decuspidata* than I have ever observed it to do.

REFERENCES TO THE PLATE

FIG.

1.	A tuft of <i>J. curvifolia</i> . natural size.	
2.	A single plant of the same.	
3.	The same magnified	6
4.	Portion of the stem and leaves	4
5.	Single leaf	3
6.	Exterior perichætal leaf	3
7.	Interior perichætal leaf	3
8.	Calyx, peduncle, and capsule	4
9.	Calyx opened, showing the calyptra, &c.	3
10.	Barræ putilla	2



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Jungermannia pumila

JUNGERMANNIA PUMILA.

(TAB. XVII.)

JUNGERMANNIA, caule ascendente, simpliciusculo. foliis elliptico-ovatis fructu terminali; calycibus oblongo-ovatis, acuminatis, ore contracto, denticulatis.

Jungermannia pumila. WITH. III. p. 866. t. 18. f. 4. Engl. Bot. 2130.

Lichenastrum Trichomanis fovee minor, ab extremitate ferens. BILL. Musc. t. 70. f. 10.
A. N. C. ? (rech. syn.)

β. monacensis, caulibus ramosis, foliis remotioribus, nigrescentibus.

HAB. Cwm Idweli. Mr Griffith, in With.—On mountains near Bantry, Ireland. Miss Hatchins.—Near Balfmt. Mr. Templeton.—Both Dr. Steiner and Dr. Taylor find it in the Dargle, near Dublin.—On rocks at Studley, Yorkshire.—*β.* On Craigallnach, in Breckinham.

Obs. It produces capsules in May and June.

THE PLANT grows in small and loosely-entangled patches, here and there sending forth, from the under side of the stem,

Roots, which are simple, pellucid, and of a whitish color.

Stems about half an inch in length and the tenth of a line in diameter, either wholly procumbent, or, as is generally the case, ascendant towards the extremity, for the most part simple, though occasionally divided, and in *Var β* (t. 8) not unfrequently throwing out young shoots from their sides.

Leaves about the third of a line in length, rather closely placed, especially in *α*; their position varying from horizontal to erect, not only in different individuals but often on the same plant, their figure ovate, approaching to elliptical, sometimes nearly round. In fertile specimens the uppermost are the largest (t. 3), in barren ones the contrary is the case (f. 8) all of them are somewhat concave, and at the base semi-amplexicaul, at the extremity I have, in two or three instances, remarked a slight and very obtuse notch but whether it arose from accident or not I am unable to

(*J. pendula*.)

BRITISH JUNGERMANNIÆ.

say. The *texture* of the leaves is thin and delicate; the *reticulation* small, roundish; the color a pale yellowish green, changing in different situations to an olive green and even to a brownish black.

Perigynial leaves not differing from those of the other parts of the plant, except that the two uppermost pair are the largest of all, and are more uniformly erect in their position (f. f. 3. 4. 5).

Male FRUCTIFICATION unknown.

FEMALE FRUCTIFICATION terminal, though it may now and then have the appearance of being lateral, in consequence of the elongation of a shoot immediately beneath it (see f. 9).

Calyx (f. 4) large in proportion to the size of the plant, somewhat exceeding three quarters of a line in length, and one quarter of a line in diameter in the widest part. It is lengthened out at the base, largest in the middle, and acuminate at the extremity, where it is slightly plicate. The mouth is small, contracted, and beset with minute teeth of unequal sizes its substance and color exactly resemble those of the leaves.

Calyptra (f. 5, ovate, white, strongly and elegantly reticulated, at the apex tipped with a short tubular style, at the base surrounded by a few barren *peristoma* fillets.

Peduncle from two to two and a half lines in length, white, glossy, transversely and longitudinally striated.

Capitula ovate, deep brown, dividing into four equal segments (f. 3).

Seeds brown, spherical, smooth. The *spiral filaments*, are of the same color, and composed of a double helix (f. 6).

My For. β might at first sight be taken for a distinct species. A patch of it has a very dark and almost blackish line, though, viewed singly, an individual plant, especially when held against the light, appears of an olive-green color. The leaves are more distantly placed than those of α they are, too, smaller, more inclining to oblong, and universally horizontal. The stems are slender and more branched, and, as observed above, frequently throw out young lateral shoots.

This *Jungermannia* was first discovered in Wales by Mr. Griffith, and by him sent as a new species to Dr. Withering, in whose work an imperfect figure and description are given. Without at all meaning to contradict these gentlemen as to the plant being really a nondescript, I find it so well accord with the Dillenian plant, figured t. 70. f. 10. a. n. c., that I have thought it right to refer to that author, though not without a mark of doubt. Linnæus refers to this synonym under his *J. lanceolata*, from which the authentic specimens in the herbarium at Oxford prove it to be quite different. These in the calyx, which is most remarkable, exactly correspond with the present plant and the leaves, too, seem to bear an equal resemblance, as far as can be judged from the very injured state in which they now are. The figures, however, of Michx., quoted by Dillenius, certainly belong to *J. lanceolata*.

BRITISH JUNGERMANNIÆ.

(*J. pumila*)

Jungermannia pumila is distinguishable from barren specimens of *J. scalaris* and *J. crenulata* by its more ovate leaves and much smaller size, from *J. lanceolata* by its leaves being concave, whereas in the species last mentioned their surface is always plane. The singular form of the calyx will serve to keep it distinct from every other species.

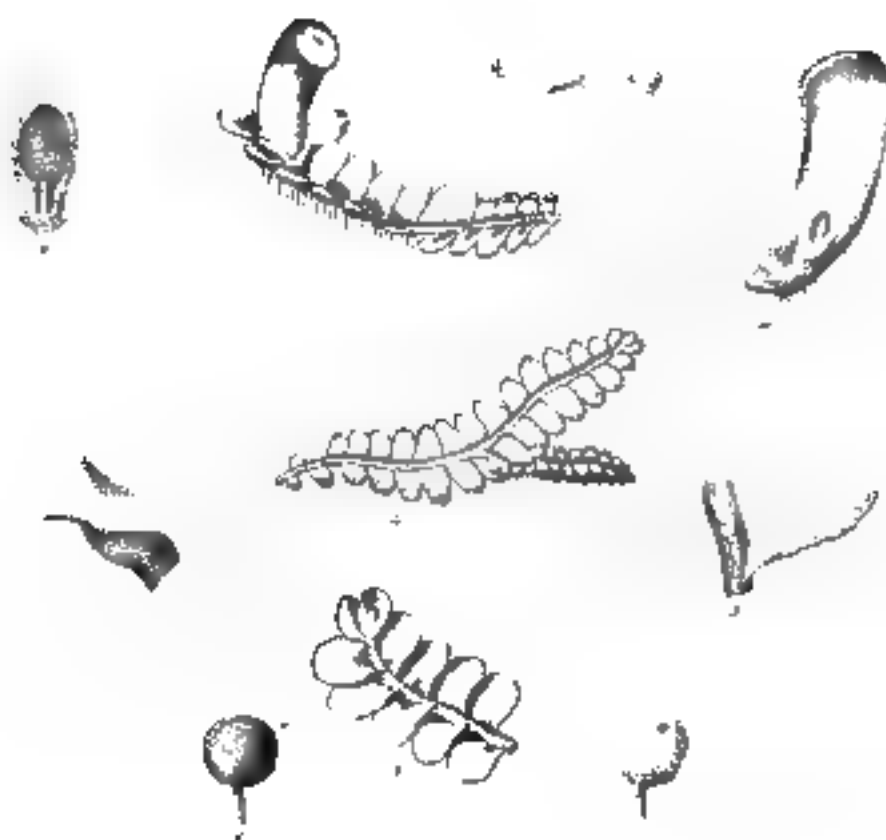
Although an alpine plant, *J. pumila* seems not at all particular in its choice of soil. Some of my Irish specimens are attached to a stiff clay in Yorkshire I have found it growing upon hard lime-stone rock; and in Scotland I have gathered it from the micaceous schistum of the Breadalbane mountains.

REFERENCES TO THE PLATE.

FIG.

- | | |
|--|---|
| 1. A small patch of <i>J. pumila</i> , natural size. | |
| 2. A single plant of the same, natural size. | |
| 3. The same, magnified | 4 |
| 4. Extremity of a fertile shoot | 3 |
| 5. Calyptra and young capsule | 2 |
| 6. Seeds and spiral filaments | 1 |
| 7. Var. β , natural size. | |
| 8. The same, magnified | 4 |
| 9. Extremity of a fertile plant of α , with the shoot projecting beyond the calyx | 4 |





Juncus mannii lanceolata

JUNGERMANNIA LANCEOLATA.

(TAB. XVIII.)

JUNGERMANNIA, caule procumbente, subsimplici foliis patentibus, ovato-subrotundis fructu terminali, calycibus oblongis, cylindricis, subarcuatis, spica depressa, plano arcuato contracta, incisa-depressa.

Jungermannia lanceolata. LINN. *Sp. Pl.* ii. p. 1587. *Syst. Nat.* ii. p. 700. POLLICH, *Pal.* iii. p. 179. LAMM, *Herb.* p. 247. SCHUMER, *Bayerische Flora.* ii. p. 495. WEA, *Plant. Crypt.* p. 114. WILD. *Her.* p. 340. OEDER, *Essen. Pl. Fl. Dae.* p. 41. ALTON, *Pal.* i. p. 312. SCHUMER, *Spic. Fl. Lips.* p. 103. SCHUMER, *Saxoni. Lief.* i. p. 4. HOFFMANN, *Germ.* ii. p. 88. ROTH, *Germ.* i. p. 373. LINN. *Syst. Nat. ed. Gmel.* ii. p. 1348. LAMARCK, *Encycl. Bot.* i. p. 279. WITH. iii. p. 853. HORS. *Angl.* p. 517. LAMOUR, *Scot.* i. p. 773. *Lichenstrum*, capitulis radiis, Trichomanis facie, foliis densius congestis, minus. HALL *Syn.* p. 112.

Jungermannia polistris, minima, repens, foliis subrotundis, densius, late viridibus. MICHAEL, *Noe. Gen.* p. B. 2. 3. f. 6. et 7.

HAB. Woods and moist shady places in Westmoreland. **HABIT.**—Moist shady banks. **HABITING.**—Moist shady places, and on rotten trunks of trees. *Lightfoot.*

PLANT growing in small dense clusters of a pale green color.

Root, a few minute, whitish, simple fibres, proceeding here and there from the under side of the plant.

Stems about a quarter or half an inch long, cylindrical, procumbent simple, or now and then furnished with one or two short lateral shoots.

Leaves (f. f. 2, 4, 6) rather closely placed, always patent or horizontal, quite entire, ovate, having however a broad and semi-amplexicaul base. Those at the base and the extremity of the barren shoots are the smallest (f. 4), the rest are about a quarter of a line in length: their color is a light, yellowish green, varying in the lower leaves to a dirty brown. The reticulation is large, composed of oblong cells.

Perichetral leaves (f. 8) larger and more oblong than the rest, at the base connate, and embracing the lower part of the calyx, their upper part patent.

MALE FRUCTIFICATION (f. 5) composed of *anthers* (f. 6), situated in clusters of two or three at the base of the cauline leaves, and most commonly of those that approach the extremity of the plant. They are quite exposed, as in the case with those of *J. pusilla*. Each is exactly spherical, minute, consisting of an exterior reticulated cuticle, and the olivaceous pollen, which is at length discharged from a ragged aperture at the extremity (f. 7). The *footstalk*, which is about the length of the anther, is white, pellucid, and transversely striated.

FEMALE FRUCTIFICATION terminal.

Calyx (f. f. 9, 10) very large, compared with the size of the plant, full a line in length and one-third of a line in diameter, a little incurved, cylindrical throughout, or slightly increased upward. the apex itself is depressed and flattened, so that the extremity is nearly a plane surface, as wide as any part of the calyx, and in the centre of it is situated the minute, contracted, and slightly-toothed mouth. The whole is perfectly destitute of furrows. Its color and texture are not distinguishable from those of the leaves, except that the former occasionally varies to a rich brown, appearing almost as if it were burnt.

Germen (f. 8) ovate, of a yellowish-green color, terminated by a small hollow style. A few *bracteæ pusillæ* surround its base.

Obs. The more forward state of the fructification I have never had an opportunity of seeing.

As well the figures here given, as the description, have been made from German specimens sent to Mr. Turner by Dr. Schrader and Dr. Mohr; and I am induced to represent the species in this work, rather with a view of calling the attention of the botanists of my country to what I conceive to be the true *Jungermannia lanceolata* of Linnæus, than from a full conviction of its ever having been found in Britain. Michx. is the earliest author who has noticed the present plant, to which Dillenius† 70. f. 10. has been referred by Linnæus and almost every subsequent botanist; but I have, under the description of *J. pusilla*, given my reasons for supposing that this synonym more probably belongs to that species. Haller, in his *Hist. Stirp. Helv.* t. ii. p. 61. in 1671, on *hæder Jungermannia foliis pinnatis. ovella, confertis, ex apice flor. feræ*, quotes Linnæus as well as the two other authors just alluded to, but in his description he says, "*folia parvis mucronata et in apice congesta, penitissime serrata*", and in another place "*ad Jungermanniam n. 90. Dillenii (J. africanæ) proxime accedit, sed differt foliis rotundioribus*"; so that I am rather induced to think that this great botanist has confounded the present species with one that I propose calling *J. ochrifolia*, which certainly approaches in many particulars to *J. albicans*. Weis has the same remark as Haller, and it is unfortunate that neither of them take any notice of the form of the calyx. Schrader and Roth are more particular on this point, so that I can quote with confidence their descriptions, while that of almost every other author is at least doubtful. Those given by Hudson, Lignisfoot and Withering, are particularly unsatisfactory, and the *Jungermannia* figured

BRITISH JUNGERMANNIÆ.

(*J. lanceolata*.)

under the name of *lanceolata* in English Botany is *J. scalaris*, a plant which I have observed in collections not unfrequently mistaken for it; although the species before us abundantly differs, not only in the absence of stipules, but in the large and naked calyx.

In drying, as is well observed by Dr. Roth, the leaves become crisped; but they rapidly recover their original figure on being immersed in water.

REFERENCES TO THE PLATE.

FIG.

- | | | |
|------|--|---|
| 1. 1 | Fertile plants of <i>J. lanceolata</i> , natural size. | |
| 2. | A fertile plant, magnified | 5 |
| 3. | A barren plant, natural size. | |
| 4. | The same, magnified | 5 |
| 5. | Extremity of a male plant | 5 |
| 6. | Anther in a perfect state | 1 |
| 7. | The same after the discharge of the pollen | 1 |
| 8. | Perichærial leaf | 4 |
| 9. | Cauline leaf | 3 |
| 10. | Calyx dissected longitudinally | 3 |
| 11. | Germen | 2 |





Juniperus communis nana

BRITISH JUNGERMANNIÆ

(*J. exsecta*.)

JUNGERMANNIA EXSECTA.

(TAB. XIX.)

JUNGERMANNIA, caule prostrato, simpliciuscula foliis distichis, imbricatis, horizontalibus, concavis, ovatis, sculis, margine hinc unidentato.

Jungermannia exsecta. SCHMIDEL, *Icones*. p. 241. t. 69. f. 2. SCHREBER, *Syst. Schem.*

Leaf. 1. p. 98?

Jungermannia globulifera, var. 1, ROTH, *Germa.* III. p. 381.

Jungermannia foliis bidentatis, in apice *fragifera*. HALL, *Hels.* t. IV. p. 59. (*excl. sp.*)

HAB. Moist and especially boggy heaths in various parts of Norfolk and Suffolk, as Holt and Edgerfield Heaths (where it was for the first time discovered in England by Rev. R. B. Francis), and Mousehold Heath in the former county. In Suffolk Mr. Turner finds it near Yarmouth. It is also abundant on Westleton Heath, near Dunwich.—Near Bawtry. Miss Hitchins.

PLANT firmly attached to the earth in small scattered patches, which are frequently disposed in a somewhat stellated form, and are rendered conspicuous by their yellow lux, or, in the globuliferous specimens, by the reddish color of the gemmae.

Root consisting of thick tufts of minute, whitish, simple fibres, issuing copiously from every part of the under side of the shoots, which are often, as Mr. Francis remarks, affixed to each other by means of these radicles.

Stems prostrate, not much exceeding a quarter of an inch in length, fragile, greenish, densely cellular, simple, or sometimes, though rarely, producing a small shoot near the base.

Leaves (f. l. 4. 5) rather closely imbricated, distichous, patent or horizontal, about the third of a line long, gradually however becoming smaller towards the base of the plant, where they closely surround and firmly embrace the stem, so as entirely to conceal it.

their figure is ovate, concave, or rather conduplicate, at the extremity very acute, and, what marks the species so decisively, furnished in the middle of the upper margin with a strong and sharp tooth, pointing a little upwards in a direction oblique with regard to the apex of the leaf. If Schrader be correct in his species, which I have great reason, however, to doubt, he finds the leaves to be generally unequally tridentate, while Schmidel, Mr. Francis, and myself, have observed them to be almost constantly bidentate, (provided the sharp apex may be allowed the appellation of a tooth,) though occasionally the lower ones, as may be seen in f 3 of the plate, are tridentate. The texture of the leaves is particularly firm, the cellular very small and numerous, requiring a good magnifier to distinguish the reticulated appearance formed by their interstices, but with the highest power of the lens the cellular will be seen to be of a very irregular figure, and disposed throughout the substance of the leaf without any sort of order (f 6). The color of the leaves is a pale green, very much approaching to yellow.

MALE FRUCTIFICATION UNKNOWN.

FEMALE FRUCTIFICATION (according to Schmidel, who alone has published an account of it, or even seen it) terminal, and produced (in Germany) in abundance in the months of May and June, if the weather should prove moist, never on those plants which bear the powdery globules, but upon such older individuals alone as are fast approaching to a state of decay. The calyx is described to be of an ovate-oblong figure, cut at the mouth into four obtuse teeth or lobes, and surrounded at the base by three or four pairs of unequally bifid and closely imbricated leaves, the sepals ovate, tipped with a rather thick vesicular stigma; the peduncle white, pellucid, cellulose, about three times as long as the calyx, the capsule roundish, approaching to ovate, bursting into four ligulate valves, that are obtuse at their extremities, the spiral filaments very elastic, composed of a double helix, of a rufo-fuscescens color. the seeds extremely numerous, minute, and of a paler hue than the filaments.

The Gemme (f 3 of this species are very abundant and peculiarly conspicuous, no less from their deep orange color than from their situation. In the months of December and January they make their appearance, collected together in small spherical masses (f f 3 5 about the tenth of a line in diameter, occupying the extreme points of eight or ten or more of the terminal leaves. The minute particles or gemme of which these balls are composed, are in their most perfect state closely united, but on putting them into water a very slight pressure is sufficient to cause them to separate, and a number of pellucid angular reddish bodies (f 6) are observable floating in the liquid. In February indeed these particles disunite of themselves, and lie scattered over the leaves and stems of the plant in considerable quantity, having much the appearance of the farina of some plumbaginous plants.

BRITISH JUNGERMANNIÆ.

(*J. erecta*.)

This singular species of *Jungermannia* seems to be confined to the two most eastern counties in the kingdom, at least I have never heard of its being found in any other places, excepting, indeed, very lately near Bantry, by Miss Hutchins, of whom it may almost with truth be said, that she finds every thing. It affects elevated and exposed situations, and is most frequently met with on these heathy soils which are not far removed from the sea. My friend, Mr. Francis, has long known it as an inhabitant of his neighborhood, and has preserved a drawing and description of it in his manuscripts under the name of *J. acuta*. Schmidt discovered it about Barchuth and Erlangen, in 1758; but, though he has given an accurate figure and elaborate history of the barren state of the species, I cannot feel satisfied that his representation of the fertile plant belongs to the same, the drawing itself of that part being unsatisfactory. This suspicion, however, has not kept me from translating in my description what he says of the fruit. That he should have fallen into an error of this kind, supposing him really to have done so, is the less remarkable, when it is recollected that he finds the fructification not upon young, healthy, and vigorous plants, "sed in vetustis et penè emortuis," so that I am very much disposed to think that he may, like Dr. Roth, have compounded *J. erecta* and *J. eresia* together. Of the Hallerian synonym, I am by no means certain the description in some respects is at variance with our plant, yet I am still disposed to think that this is what the author really intended, from his speaking of the extremity of the leaves, as "*ruberrimum quasi fragum ferens*." The greater number of synonyms, too, that are cited by Schmidt, have been here omitted, because it appears to me that they ill accord with the characters of *Jungermannia erecta* which, if really permanent, as I have every reason to hope they are, are so striking, and so dissimilar to those of every other species of the genus, that I feel it would be quite needless to say any thing more respecting them.

§1

REFERENCES TO THE PLATE.

Fig.

- | | | |
|---|---------------------------------|---|
| 1 | <i>J. erecta</i> , natural size | |
| 2 | Barren plant, magnified | 6 |
| 3 | Globuliferous plant | 6 |
| 4 | Portion of the stem and leaves | 4 |
| 5 | Leaf | 3 |
| 6 | Apex of a leaf | 1 |
| 7 | Cluster of Gemmæ | 3 |
| 8 | Gemmæ | 2 |







Jugermannia schizantha

JUNGERMANNIA SETIFORMIS.

(TAB. XX.)

JUNGERMANNIA, caule erecto, subimplexo. Folia biseriata, areis lubricatis, erectis, quadratis quadrifidisque, angulis inferioribus margine hinc illic spinuloso-dentatis fructu terminali lateralique, calycibus oblongis, pilosis ore aperto.

Jungermannia setiformis. ZERN. Beitr. Band. III. p. 40. SCHWAB. Syst. Schweiz. Lief. II. p. 4. HOFFMANN, Germ. I. p. 82. ROTH, Germ. III. p. 364. LAMX. Syst. Nat. ed. Gmel. II. p. 1352. LAMARCK, Fl. Fr. II. p. 437.
Jungermannia concolorata. LICH. Lapp. ed. Smith. p. 343.

β. ALPINA; foliis minoribus; segmentis integerrimis.

HAB. α has not hitherto been found in Britain.—β grows in great abundance upon the summit of Cairngorm; and I have also received it from Mr. Dickson and Mr. George Dunn of Forfar, both of whom gathered it upon the Scotch Alps.

PLANT growing in densely matted tufts of some inches in diameter.

Root scarcely any, except that a few fibres may now and then be seen to proceed from the lower part of the plant.

Stems from two to three inches in length, filiform, slender, unbranched, of a red or reddish-brown color, and firm texture, erect, simple, or once or twice irregularly dichotomous.

The **Leaves** (f. f. 4. 7. 8) are bifarious, erect, appressed, and so closely imbricated as to conceal the stem on every side. They are about a quarter of a line in length, of a quadrate figure, but rather broader than long, semisubplexical, divided from the extremity to within one-fifth of the base in α (in β to within one-third of that distance) into four equal, lanceolate, erect segments, which are keeled on their inner surface, and flattened on the outer; their margins are recurved, those of α here and there beset with unequal, but strong teeth, generally pointing downwards, while in β, these margins are quite entire, though, in the lower angles of the leaves, in both the varieties, there are, immediately adjoining the base, two deflexed teeth, the lowest of

which is the largest. The texture of the leaves is rigid and brittle when dry; the cellular which are of a roundish figure, are distantly placed, yet somewhat regularly, in longitudinal lines (f 9). The color is a pale yellowish brown, inclining to olive in the Scotch variety.

Perichætal leaves (f 10) larger than the rest, and protruding, as it appears to me, from all sides of the stem. The divisions of these leaves too are more numerous, frequently six or even seven, their margins more recurved, their teeth larger and more abundant. In other respects they exactly agree with the common ones.

Male Fructification unknown.

Female Fructification cavity both terminal and internal.

Calyx (f f. 8. 11) nearly a line in length, oblong, pilose, the mouth toothed, but not at all contracted, the texture thin and rather delicate, much more so than that of the leaves. The reticulation small, the areole oblong, the color a pale yellow brown.

Calyptra obsolete, reticulated, white, style rather short, slender, and tubular. The barren pistils are numerous, situated at the base of the calyptra, each is linear, swelling out a little in the middle. Its mouth slightly expanded.

The Capsule I have only seen within the calyptra, at which period of its growth it is exactly spherical, and of a deep olive-green color.

—————

That the two plants here figured belong to one and the same species, I believe there will be found no reason to doubt. My variety β differs from α only in being smaller and of a more olive-green color, and in having the segments of the leaves entire. The drawing of α I have been under the necessity of taking from foreign specimens: for this, I trust, no apology will be considered necessary, as I could not otherwise have represented the fructification, which is now described for the first time, though my description has been taken from the very specimens gathered in Lapland by Lænnæus, who, in his own account of the plant, leaves the fructification unnoticed. The Lapland specimens, it may be remarked, as well as the German, and probably the French ones, too, are found in woods, whereas our British plant inhabits the highest of the Scotch Alps, and this difference in the place of growth may perhaps be considered as a cause in some measure of the different appearances they put on. From Dr Swartz, also, I have been favored with fructified specimens, exactly agreeing with those here figured.

Elmhirst, who first discovered *J. setiformis* in the Harz Forest, in Germany, justly remarks that the leaves are so deeply divided, that each individual may be taken for four separate leaves: but I cannot agree with that author in thinking that the segments are so strongly furrowed on the back as to represent in miniature a leaf of *Festivella antipyræica*. He further adds, that he knows of no other plant which has such a peculiarity in the leaf.

There is in the general habit of this plant, particularly in the mode of growth, a considerable affinity with *J. jalsena*. In both the leaves are rigid and brittle, and those, which clothe the stem of the former, correspond very nearly in figure with the perichætal ones of the latter. The form of the calyx is the same in both, as is also that of the capsule.

BRITISH JUNGERMANNIÆ.

(*J. setiformis*.)

REFERENCES TO THE PLATE.

FIG.		
1.	<i>J. setiformis</i> β , natural size	
2.	<i>J. setiformis</i> α , natural size	
3.	Portion of the stem of β , magnified	6
4.	Leaf of the same	4
5.	Portion of the fertile stem of α	5
6.	Smaller part of the same	4
7. 8.	Leaves	3
9.	Apex of a leaf	1
10.	Perichetral leaf	3
11.	Calyx, longitudinally dissected	4
12.	Calyptre and barren pistilla	9
13.	Capsule in a young state	8
14.	Barren pistillum	1





Jungermannia nemoralis

JUNGERMANNIA NEMOROSA

(TAB. XXI.)

Jungermannia, caule erecto, subbichotomo foliis bifariis, inæqualiter bilobis, dentato-ciliatis, lobis conduplicatis; inferioribus majoribus, oblongis, superioribus suborbatis, obtusis fructu terminali, calycibus oblongis, incurvatis, compressis ora truncato, dentato-ciliato.

Jungermannia nemorosa. Linn. Sp. Pl. ii. p. 1808. Pollacz, Pal. iii. p. 167. Lessk., Herb. p. 250. Wessk., Spic. Fl. Goet. p. 140. Oudem., Enum. Pl. Fl. Dan. p. 4. Hedwig, Theoria. p. 156. t. 17. Allison, Fl. Ped. ii. p. 219. Villars, iv. p. 923. Roth, Germ. ii. p. 220. Schrad., Samml. Lief. ii. p. 5. Hoffmann, Germ. ii. p. 65. Huds. Angl. p. 212. Linn. Syst. Nat. ed. Gmel. ii. p. 1350. Lamarck, Encycl. iii. p. 281. With. iii. p. 857. Lamarck, Pl. Fr. ed. 2. v. ii. p. 435. Engl. Bot. i. 007. Lamarck, Fl. Gall. p. 33.

Jungermannia nemorosa. Linn. Syst. Nat. ii. p. 700. Scopoli, Carn. ed. 2da. ii. p. 344. Wessk., Plant. Crypt. p. 131.

Jungermannia truncata. Engl. Bot. i. 2437.

Jungermannia nemorosa, foliis acutioribus, auritis, tenuissime denticulatis, flore insidente pediculo breviori. Michx., Nov. Gen. p. 7. t. 5. f. 3.

Jungermannia alpina, supina, foliis acutioribus, auritis, tenuissime denticulatis, flore insidente pediculo breviori. Michx., Nov. Gen. p. 7.

Lichenastrum auriculatum, plantis minoribus crenatis. Dill. Musc. t. 71. f. 18. Rorr. Jen. p. 402.

Lichenastrum auriculatum, plantulis rotundis, crispum. Dill. Musc. t. 71. f. 19.

Jungermannia foliis bipartitis, auriculatis, supinis punctiferis. Hall. Hede. v. i. p. 38.

§. *recurvifolia*, foliis purpureo-erectis.

Jungermannia coriariiformis. With. i. i. p. 858.

Jungermannia purpurea. Engl. Bot. i. 1023 (excluding the magnified figure on the left side of the plate, which belongs to *J. albacor.*)

Jungermannia alpina, polistria, purpurea. canbica, foliis rotundioribus auritis, tenuissime denticulatis. Michx., Nov. Gen. p. 6. t. 5. f. 18.

Lichenastrum auriculatum, Ornithopodi minoris, plantulis ciliatis. Dill. Hist. Musc. t. 71. f. 21.

γ. *recurvifolia*, foliorum lobis lobulisque recurvatis.

δ. *obovata*, foliorum lobis lobulisque subintegerrimis.

HAB. In woods on hedge-banks, and among rocks— β on the Scotch mountains abundant, chiefly in much exposed and very moist situations—*Sivulæ* and *lægæ* on the mountains of North Wales. Mr Griffith—Mountain near Santry. *Moss Hutchins.*—About *Knawick*. Mr Lye—*γ* was found by the Rev. R. B. Francis, in Wales.— δ grows, intermixed with α in woods and heathy places.—At *Edgefield*. Rev R. B. Francis. *Woods* near Norwich.

USE. The fruit *findus* is observable during the greater part of the summer months, among the mountains.

PLANT growing for the most part in densely matted tufts, of two or three inches in diameter. Root, a few minute peduncled fibres, proceeding in bundles from the lower part of the stem. Stems root varying from one to three, or even four inches in length, about the tenth of a line in diameter generally of a dirty brown color, but sometimes a yellowish red, and occasionally in wet situations becoming quite black. twice or thrice divided in an irregularly dichotomous manner besides which they also produce succubations, which are, like the parent branches, *serotina* and *filiform*.

Leaves (f. f. 5. 11 ?) *belucina* and *disticha*, rather loosely imbricated, patent, their margins strongly *dentato-ciliatæ* at the base of the plant they are the smallest, being there scarcely half a line in length, but they gradually increase in size as they approach the extremity where they are nearly one line long they are *semi-amplexual*, *decurrent*, divided to within one third of the base into two unequal *conduplicate* lobes*, of which the superficial is parallel with the stem, and, consequently vertical with regard to the horizon, the lower one is twice the size of the upper, *obovate* more or less acute, slightly convex above, and appressed to the under side of the stem; the upper lobe or lobule is subcordate, obtuse, a little convex, with its base embracing the stem, so as entirely to conceal it in those parts where the leaves are at all crowded their texture is delicate the *cellulæ* f. 5. compact, very minute, roundish; the color a pale yellow green, more or less inclining to brown, in δ , a deep purple.

Perigynial leaves closely imbricated, and much resembling the *umbosæ* ones, except that their base is more ventricose, and their apices always recurved.

The *peristichial leaves* differ from the rest only in being of a larger size, and in having the margins frequently recurved.

Male Fruification *gathers* (f. f. 8. 10. 11) situated in the axilla of the perigynial leaves, ovate or roundish, when perfect of an olive-green color, but appearing, after the discharge of the pollen, a pellucid, reticulated, extremely delicate membrane. Each is situated on a transparent transversely striated footstalk, which scarcely exceeds the anther in length. In

* It was my intention to have adopted the term *ovate* for the upper and generally longer division of the lobes, in this species and its allies, in conformity with the Linnæan nomenclature. Butinde, however, does this not differ, in one or two of the species, from the lower lobe, that it appears to me I shall render my description more simple and intelligible, by considering the leaves in question as divided into two lobes, which are either equal in size or unequal. In the latter case, the larger one may be termed *lobus*, and the smaller, *lobulus*, as suggested by Dr. Smith in *English Botany*, p. 2431. The word *ovate*, might, I think, with more propriety, be confined to those lower divisions of the leaves of *Jungermannia*, which, in every part of the plant, constantly differ in figure and size, from the larger division. remarkable instances of which may be seen in *J. fluctuosa*, *J. Tamarisci*, and *J. subulæ*. Yet, even in the species of this very natural division of the family, the *ovate* of the peristichial and of the young terminal leaves sometimes form an exception to this rule.

the axils of the perigynial leaves, also, and (intervalled with the anthers, are frequently seen jointed, simple or slightly branched) filaments (f. f. 11, 12), but whether they belong to the fructification, or are to be considered as some parasite (perhaps a *Fraxinea*), I was unable to determine. I have found them on British specimens as well as on others, which I have received from Sweden. Had I not seen, in some of them, small branches, I should have supposed they had been abortive footstalks, for their structure, in other respects, seems to be exactly the same.

FEMALE FRUCTIFICATION terminal upon the stems and branches.

Calyx f. 4. about a line and a half long: at its base narrow and cylindrical, but thence gradually increasing in width towards the extremity, which is half a line in diameter: it is remarkably incurved in its early state, but becomes erect when the capsule is protruded. The mouth is truncate and dentate-ciliate. In color and texture it resembles the leaves.

Calyptra (f. 13) a white, thin, delicate membrane of a pyriform figure, marked with rather large reticulations: the style is short and tubular. Of *strobilic papilla* (f. 14) there are a few at the base of the calyptra, linear greenish, longitudinally and transversely striated, their mouth slightly dilated.

Peduncle short, scarcely exceeding twice the length of the calyx, white, reflexive, shining.

Capsule oblong-ovate, deep purplish brown, opening into four equal, imbricate valves, which on their outer surface are longitudinally and transversely furrowed.

Seeds and spiral filaments (f. 15) numerous, of a deep fulvous color: the former exactly spherical, the latter composed of a double helix, of a greater length than is usual in the genus.

Gemmae (f. 7) are not succulent on this plant: in the month of July, forming a compact granulated wart or tubercle, at the extremity of both the lobes of the leaves which are situated at the apex of the stems: at first they are green: in a more advanced period, brown: and at length almost black, in which state the particles, of which they are composed, more readily separate, and are seen, under a high power of the microscope to be oblong, pellucid, and by no means angular.

Var. β (f. 16) scarcely differs from α , but in the deep purple color of the whole plant. In both kinds the figure of the leaf is subject to some slight variation, from obovate to rotund-obovate.

The lobes, in the lower part of the plant, appear occasionally to have the teeth nearly obsolete.

The **Var. γ** has a crisp and inelegant appearance, from the circumstance of the lobes and lobules of the leaves being by no means cuneuplicate, but irregularly heart back, as is represented at (f. f. 1 and 6). The color, too, is more suffused to a yellowish-brown.

Var. δ (f. f. 17, 18) approaches, in the figure of its leaves, *Jungermannia umbrosa*, but may be distinguished by the greater proportional length and slenderness of the plant, in having its leaves more distantly placed, and in these being for the most part quite entire at the margin. The upper leaves, indeed, are slightly dentated. It is an extremely minute variety, scarcely attaining to half an inch in length, and is always found lateralized with α . The color of the stem and leaves is a very pale yellowish-green.

The strongly dentato-ciliated margin of the leaves in *J. nemorosa* will readily serve to distinguish it from its associates, and especially from *J. undulata* and *J. umbrosa*, to which, in general habit and mode of growth, it bears considerable affinity. Micheli appears to be the earliest writer who has noticed this species, and has twice represented it in t. 8, of his *Genera Plantarum*. This acute observer has also remarked the Gemme, which he mistook for seeds, but his figure of them is by no means accurate. Hedwig has admirably illustrated this part, though he has likewise fallen into an error in considering it to be the male Bower, from which it differs essentially in form, structure, and situation. Dillenius', t. 71, f. 18, is very characteristic of the plant, infinitely more so than his f. 2, of the same plate; which, however, I have ascertained, by an examination of the original specimens, to be a variety possessing a purplish tinge. Tab. 71 f. 19, also belongs to the same species.

Dr. Smith and Willdéring have confounded the purple variety of this species with *J. purpurea*, of Wess (*Majus Jungermannia*, Lonn.), with which it corresponds in color and place of growth, though in every other respect it is widely different. The three figures above quoted, in *English Botany*, unquestionably all belong to the same plant.

REFERENCES TO THE PLATE.

FIG.

1	<i>J. nemorosa</i> γ (male plant), natural size.	
2	Female plant, natural size.	
3	Female plant magnified	6
4	Upper extremity of a female plant seen from behind	5
5	Leaf	3
6	Lower leaf	5
7	Leaf with Gemme	4 and 1
8	Leaf of <i>J. nemorosa</i> , var. γ	6
9, 10, 11	Anthers and filaments	1
12	Branched filament	1
13	Calyptra	2
14	Abortive pustilla	1
15	Seeds and spiral filaments	1
16	<i>J. nemorosa</i> , var. β.	5
17	<i>J. nemorosa</i> , var. α, natural size.	
18	<i>J. nemorosa</i> , magnified	6
19	<i>J. nemorosa</i> , var. α leaf of	4





Jungermannia undulata

JUNGERMANNIA UNDULATA.

(TAB. XXII)

JUNGERMANNIA, caule erecto, subdichotomo foliis bifariis, inæqualiter, bilobis, undulatis, integerrimis, lobis subrotundis, connatis. inferioribus majoribus fructu terminali, calycibus oblongis, incurvatis, compressis, ore truncato, integerrimo.

Jungermannia undulata LINN. Sp. Pl. ii. p. 1338. Syst. Nat. ii. p. 705. POLLOCK, Pol. iii. p. 186. WALL, Plant. Crypt. p. 120. WEBER, Spic. Fl. Gœt. p. 139. OEDER, Enum. Pl. Fl. Itœ. p. 41. SCHUMER, Antiseke Flœr. n. p. 497. HOFFMANN, Germ. ii. p. 63. ROTH, Germ. iii. p. 389. LAMARCK, Encycl. ii. p. 281. WIRTH, p. 856. LINN. Syst. Nat. ed. Gmel. ii. p. 1350. HEDD. Angl. p. 512. LICHTE Scot. i. p. 776. LAMARCK, Fl. Fr. ed. 2. v. ii. p. 433. LAMARCK, Fl. Gœt. p. 93. ENGL. Bot. 225. (the fructified specimens in the figure, appear to belong to *J. regularis*.)

Hepatica variegata, undulata squamifera. VAILLANT, Bot. Par. p. 98. n. 2. t. 19. f. 69.

Lichnum trum pinnis auriculatis majoribus et non crenatis. DILL. Myc. t. 74. f. 17.

HAB. Wet situations in various parts of the kingdom, in the alpine districts most abundant.

Obs. It produces fructification in May and June. Mr. LYNCH finds the male fructification in July.

PLANT growing in large and closely matted tufts of a considerable size.

Stems consisting of a few simple, short, pellicled fibres, produced from the lower part of the *Stems*, which are from one to three or four inches high. either simple, or once or twice divided, with nearly erect, dichotomous branches. their color in the young state a dirty green, at a more advanced period almost black, sometimes also a yellowish-brown. their texture rigid, brittle when dry.

Leaves (f. f. 3. 8) disposed as in *J. nemoros.* in a bifarious and distichous manner (f. f. 3. 5) the lower ones small, most distantly placed, the upper ones more crowded, slightly imbricated, from a line to a line and a half long. all of them patent, but at the base, decurrent and semi-amplexicaul, divided into two unequal connate, vertical lobes, the lower one of which is the largest, and appressed to the broader part

(*J. undulata*.)

BRITISH JUNGERMANNIÆ.

of the stem, the upper one, or lobule*, is smaller by one half: they are both of a roundish figure, sometimes a little pointed, slightly waved or undulated, the margins entire, or at most obscurely crenate in a few of the terminal ones. The texture is, for so large a plant, peculiarly thin and delicate; the venation small, composed of roundish reticulae. The color varies from its most usual appearance of dark and dull green, with often a purplish tinge, to deep purple, and even almost to black.

The *Perigonal Leaves* (f. 4 D) are scarcely distinguishable from the common radical ones, except that they are more crowded and imbricated. Their base, too, is somewhat ventricose. They are situated at or near the extremity of a stem.

Perichæstæ Leaves (f. 6) somewhat larger than the rest, which they in other respects resemble, and are, like them, either entire, or slightly crenate, but so slightly as to be visible only with a microscope.

Male Fructification (f. 9) situated in the axille of the perigonal leaves. *Anthære* (f. 10) small, in clusters of from three to five or six, each of them ovate, pellucid, faintly reticulated, filled with a greenish pollen, the footstalk somewhat longer than the anther, white, pellucid, and transversely jointed.

FEMALE FRUCTIFICATION (f. f. 2 3. 6) terminal upon the stems and larger branches.

Calyx (f. 6) about two lines long: its base is narrow, attenuated, and cylindrical, thence it becomes broader, compressed and incurved towards the mouth, which is truncate and entire. As the fructification advances, the calyx becomes nearly erect. In color it resembles the leaves. Its texture is less delicate.

Stylus oblong, somewhat pyriform, with a short tubular style, and a few barren pistilla at its base.

Peduncle half an inch long, white, shining, cellulose, often having a twisted appearance, terminated by the ovato-oblong

Capsule of a deep brown or chocolate color, which splits into four equal, nearly lanceolate valves.

Seeds and Spiral Filaments (f. 7) much resembling those of *J. nemoralis*; but the filaments are scarcely so much lengthened.

Upon the summit of Ben Nevis, in the month of July, I found *Gemma* (f. f. 12, 14, upon this species, collected together in ovate masses, one or two of which were situated in the terminal cluster of leaves: their color was a pale yellow green, each particle was oblongo-ovate, pellucid, and entirely free from angles.

Vallant's description and figure, above quoted, are so imperfect that, as Dr. Smith justly observes, they cannot with certainty be referred to any thing. His account of the gemmae,

* Some of the terminal leaves, as is remarked by Dillenius, have the upper lobe nearly of the same size as the under one, but this appears to me to apply only to such as have not reached their full size, and are almost concealed by the older surrounding ones.

BRITISH JUNGERMANNIÆ.

(*J. undulata*.)

however, which are evidently what he took for the seeds, very exactly correspond with those of our plant. After speaking of the leaves, he says, "L'extrémité de ces feuilles forme des espèces de rosettes, dans le milieu des quelles se voyent de petits grains jaunâtres et transparents, qui selon toutes les apparences sont les semences de cette plante." Dillenius has so well described the structure of the leaves of this species, that I shall here quote his words. "Aque immensa obsoletis ex fusco viridia folia sunt pellacida, superiora versus majora, inferiora versus minus, subrotunda, supra convexa, infra concava, & duabus laminis ad basin unitis et complicatis composita, laminæ murei superiori, seu (pe) pinne impositæ. Ex parte differentia observatur, quod extrema folia & locinus præ æqualibus constant. Quoniam folia vix hinc sunt, hæc foliorum structura facili percipitur, neque vero absolute sequentium spectatum (*J. nemorosæ resupinatæ et albicantis*), folia similiter formata esse, licet ob exiguitatem non tam facili distinguatur. Pinne per lentem non crenatæ apparent."

The erect mode of growth, much larger size of the plant, and the smoothness of the lobes compared with the leaves, are marks by which *J. undulata* may always be known from *J. resupinata*, while the entire margins of the leaves and mouth of the calyx, as well as the more delicate structure and undulated appearance of the former (which is particularly the case when the plant is dry), will equally distinguish it from *J. nemorosa*. The gemmæ also differ both in color and situation.

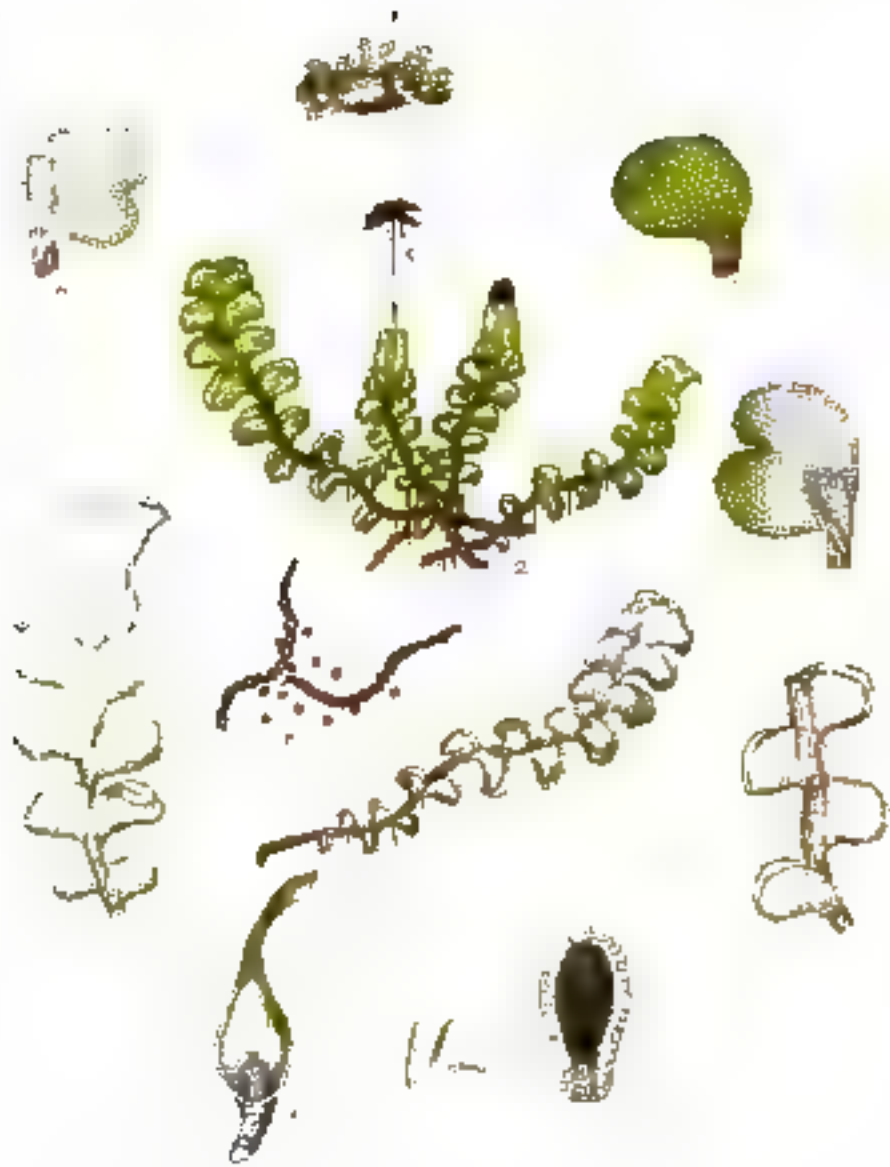
Follich remarks, that the barren succull of this plant produce at their apices "globulos pygmaeos, pusillos, sex aut septem, etiam plures sessiles," which accord rather with the gemmæ of *J. nemorosa* than with those that I have seen of *J. undulata*.

REFERENCES TO THE PLATE.

FIG.

- | | | |
|----|--|---------|
| 1 | <i>J. undulata</i> , male plants, natural size. | |
| 2 | Female plants, natural size. | |
| 3 | Female plant magnified | 6 |
| 4 | Extremity of a male plant | 6 |
| 5 | Portion of a stem with its leaves | 4 |
| 6 | Extremity of a female plant | 5 |
| 7 | Seeds and spiral filaments | 1 |
| 8 | Perigynous leaf | 3 |
| 9 | Perigynous leaf, with the lobule expanded for the purpose of exhibiting the situation of the anthers | 3 |
| 10 | Anthers | 1 |
| 11 | Gemmiferous plants of <i>J. undulata</i> , natural size. | |
| 12 | Gemmiferous plant magnified | 6 |
| 13 | Mass of gemmæ, removed from the plant | 4 |
| 14 | Gemmæ | 2 and 1 |





Jungermannia rufopunctata

JUNGERMANNIA RESUPINATA

(TAB. XXIII.)

JUNGERMANNIA, caule procumbente, simpliciusculo. Folia bifaria, rotundatis, subaequaliter bilobis, integerrimis, lobis conduplicatis. Fructu terminali, calycibus oblongis, acuminatis, compressis, ore truncato, minutissime crenato.

Jungermannia resupinata. LINN *Sp. Pl.* ii. p. 3658. *Syst. Nat.* ii. p. 700. *H. Saec.* p. 401. POLLOCK, *Fal.* i. i. p. 186^o. WEBER, *Spir. Fl. Goet.* p. 141. LEBER, *Herb.* p. 260. SCHWAB, *Botanische Flora* ii. p. 498. OEDER *Enum. Pl. Fl. Jura* p. 41. HOFFMANN, *Germ.* i. p. 84. ROTH, *Germ.* ii. p. 391. HUBER *Aggl.* p. 512. LIGHTF. *Spot.* ii. p. 778. LINN *Syst. Nat. ed. Gmel.* i. p. 1350. LAMARCK, *Encycl. Method.* iii. p. 281. WITT. p. 653. LAMARCK, *R. Fr.* ed. 2. v. i. p. 435. LAMARCK, *Fl. Gall.* p. 93.

HAB. About Edgelyield, on a loamy soil, and on the heath at Hempstead-hill, Norfolk. **REV. R. B. FRANCIS**.—Not unfrequent in various parts of Norfolk and Suffolk, in shady places, under the trailing stems of *Erica*.

Obs. It produces capsules in May and June. In the early part of the spring, Mr Francis finds plants bearing anthers.

PLANT, when fertile, generally found in small and rather dense tufts. barren individuals more frequently grow distant and straggling.

Root a few whitish, pellucid fibres, proceeding here and there from nearly the whole length of the under side of the plant.

Stems from half to three-quarters of an inch long, simple, sometimes, though rarely, once or twice forked, flexuose, procumbent, their apices erect only when in a state of fructification, or when the shoots are crowded together. Their color is a reddish brown.

Leaves, in fertile plants, rather closely imbricated, especially towards the extremity, in barren ones, generally more distantly placed, always bifarious, horizontal, about half a line long, of a roundish figure (f. f. 5. 6), divided into two nearly equal, conduplicate, and, with regard to the stem, vertical lobes, which, however, are not so closely folded as those of *J. nemoros* and *J. undulata*. each of them is convex on its outer surface;

on the lower part of the plant the *inferior lobe* is somewhat larger than the other; the rest of the leaves have their lobes equal in size, and every where entire, except that some of the terminal ones, with the assistance of a good microscope, may be observed to be very minutely, though sharply, crenate at the base they are decurrent and semi-amplexicaul, so that, except where they are distantly placed, the conduplicate leaves entirely sheath and conceal the stem on both sides. Their color is a yellowish brown, with but little of a green hue. Their texture less delicate than that of the leaves of *J. undulata* the *cellules* are small and roundish.

Perigonal leaves, situated at or near the extremity of a stem, and like the cauline ones, except in having a ventricose base, and in being generally more crowded.

The *Perigonal leaves* differ only in a slight degree from the rest. Their lobes are equal in size, and faintly toothed or crenate (f. 5).

Male Fructification placed in the axilla of the perigonal leaves. *Anthere* exactly similar to those of *J. nemorea* and *undulata* growing in clusters of from five to six or seven in the axilla of each leaf.

FEMALE FRUCTIFICATION terminal.

Calyx (f. 6) three quarters of a line or more, in length, at the base narrow and cylindrical, thence becoming depressed, and at the extremity quite flat in a young state it is much incurved, but, as the fructification advances within, it becomes erect and much less depressed. The mouth is truncate and minutely crenate.

Calyptra (f. 9) obovate, whitish, pellucid, reticulated, terminated by a short style. At its base are a few abortive pistilla (f. 10), linear, or a little swelling towards the base, marked all over with longitudinal and transverse lines their mouth is a little expanded.

Pedicels scarcely half an inch long, white, pellucid, cellular.

Capsule ovate, deep brown.

Seeds (f. 10) of a fulvous brown, spherical, *spiral filaments* (f. 10) of the same color, composed of a double helix.

~~—————~~

Although the Dilkeian figure (t. 71 f. 18) has been quoted by almost every writer upon the subject, as a synonym to this species, yet it is certain that it only represents a small variety of *J. nemorea*. It requires, however, to be remarked, that in the original specimen there are no traces of any lateral fructification, as the plate and description would lead us to imagine. With regard to the other references, which I have been led to retain, I regret to say that it is by no means in my power to speak with the certainty I wish. Füllsch's plant is very doubtful, and I suspect that both this author, and Lightfoot, may have confounded *J. resupinata* with *J. undulata*. Weber's description accords well with our species, except where he remarks that the leaves are "ovata, acuminate." Of the articles he justly observes that they are "in superioribus arcuatis superficie alterius, concave, folia non multum minoris, rotundata." Leers has done no more than copy the Linnean character. Roth, as usual original, says that

BRITISH JUNGERMANNIÆ.

(*J. resupinata*.)

the species is distinguished by the auricles being but little less than the leaves, which is certainly true; but he unfortunately gives a second character, quite the contrary, the lateral situation of the calyces, which are undoubtedly terminal. Lennæus's descriptions are particularly imperfect and unsatisfactory.

J. resupinata has in many respects a resemblance to *J. undulata* but is to be distinguished from it by its much smaller size, its procumbent mode of growth, and its nearly equal, concave, conduplicate, but not closely appressed, lobes. The entire margins of its leaves, and their figure, will always prevent it from being confounded with *J. nemorosa* and *J. pubescens*. *J. saricicola*, of Schrader, a plant very abundant on the Continent, but one which has not yet been detected in Britain, approaches the present species in color, and in the division of the leaf into two nearly equal lobes. Of this plant, however, the leaf is concave, and the lobes not conduplicate, but remarkably involute and pointed.

It has been in another place observed, that the figure in *English Botany* named *J. resupinata*, belongs to *J. nemorosa*. Dr. Smith, like Roth, probably relying upon Dillenius, describes the fructification of his species as usually growing from the side of the stem; but this, as far as I have had the opportunity of remarking, is always, as above remarked, terminal, though it is probable that it may occasionally have the appearance of being lateral, when a young shoot originates immediately beneath it.

The male fructification I had no opportunity of seeing, till some time after the plate was engraved, so that it could not then be inserted.

REFERENCES TO THE PLATE.

FIGS.

1. <i>J. resupinata</i> , natural size.	
2, 2. The same, magnified.	6
3. Portion of the stem and leaves.	4
4. Leaf.	3
5. Perichætal leaf, with the lobes expanded.	3
6. Cauline leaf, with the lobes expanded.	3
7. View from behind, of the extremity of a fertile stem.	4
8. Side view of a calyx, longitudinally dissected.	3
9. Calyptra containing the young capsule.	2
10. Barren putilla.	1
11. Seeds and spiral filaments.	1



Jungermannia umbrosa

JUNGERMANNIA UMBROSA

(TAB. XXIV.)

Jungermannia s. caule erecto, subramoso foliis bifariis, inæqualiter lobis lobis conduplicatis, apice serratis, scutis inferioribus majoribus, ovalis; superioribus rotundato-ovalis fructu terminali; calycibus oblongis, incurvatis, compressis, ore truncato, integerrimis.

Jungermannia umbrosa. SCHREBER *Sched. II. p. 2. ROTH, Germ. I. c. p. 390.*

HAB. On Ben Nevis, and in the Den of Rechip, near Dunkeld,—Mountain, near Powerscourt Waterfall, Ireland. *Mr. Mackay.* Guttered in fructification, in the months of April and May, upon Boulacross Mountain, in the county of Wicklow, by Dr. Taylor and Mr. Mackay.

PLANT growing in rather small and dense patches, among other *Jungermannia* and Mosses.

Root consisting of a number of minute fibrous radicles, principally issuing from the lower part of the plant.

Stems short, generally not much exceeding half an inch in length, erect or ascendent flexuose, of a pale reddish-brown color, simple, or once or twice dichotomous but producing also young lateral shoots, sometimes singly, sometimes two or three together from near the extremity (f 3).

Leaves (f. f 5 6) bifarious, distichous, horizontal, rather closely placed, imbricated, divided into two unequal, conduplicate, appressed, and verticillate *lobes*, of which the inferior is much the largest, and is half a line long, ovate, acute, recurved, especially in those that approach the apex of the stem (f 3), and sharply serrated, though the serratures are irregular in size and distance, and do not extend more than half way down the margins from the point. The superior lobe is not so large by two-thirds as the inferior. It is of a rotundate-ovate figure, acute, its exterior surface convex, its apex sharply, but unequally, serrated. The color of the leaves is a pale and bright yellow green, sometimes inclining to brown, the terminal ones often tipped with a fine purplish tinge. The texture is rather firm and rigid. The *cellules* roundish, minute.

In the perigonal leaves, which I have only hitherto observed to be situated about the middle of the stem, the lobes are almost equal in size, and not at all serrated. These are closely appressed.

The perichætic leaves resemble the cauline ones in every thing but in having the inferior lobes more recurved, and the superior about half their size.

MALE FRUCTIFICATION axillary. *Anthers* in small clusters of three or four in each perigonal leaf ovate reticulated, situated upon a short, transversely-striated, pedicel footstalk.

FEMALE FRUCTIFICATION terminal upon the stems and branches.

Calyx (f. 5) nearly three quarters of a line long, at the base cylindrical, or, when the germen has arrived at its full size, ventricose, thence becoming depressed and quite flat at the mouth, which is truncate and equic. In texture and color the calyx corresponds with the leaves.

Calyptra (f. 7) obovate, membranous, reticulated, tipped with a short tubular style. At the base are a few short and nearly linear barren stigmata.

Protheca about half an inch long, white, succulent, striated transversely and longitudinally.

Capsule (f. 6) ovate, brown, opening into four equal, ovate-lanceolate valves.

Seeds and *spiral filaments* fulvous brown, the former spherical, the latter composed of a double helix.

At the time when the plate of *J. umbrosa* was engraved, my Scotch specimens of this elegant species of Jungermannia, were the only ones known as British, but I have since been able to make considerable additions to my description of the plant, by means of others which I have lately received from Dr. Taylor and Mr. Mackay, gathered in a fine state, and containing both male and female fructification. All of them agree well with authentic individuals sent to Mr. Turpin by Dr. Schrader, as well as with the admirable character of it, given by the latter gentleman in his *Spit. Saam. Krypt. Gewächse*.

The plant has a peculiarly handsome appearance, from the recurved leaves at the apices of the stems and branches, which is more striking in the young shoots. It is distinguished from its associate, *J. nemorosa*, by the more narrow lobes of the leaves, their more ovate figure, and especially by their being truly serrated (by no means dentato-ciliate), and by the entire mouth of the calyx.

REFERENCES TO THE PLATE.

FIG.

1, 1, 1. *J. umbrosa*, barren plants, natural size.

2. Fertile plant, natural size.

3. Barren plant, magnified

4. Fertile plant

5. Extremity of a fertile shoot

6. Leaf

7. Calyptra

8. Capsule empty, having discharged its seeds

6

6

6

9

1

9





Juggermannia albicans

JUNGERMANNIA ALBICANS.

(TAB. XXV.)

JUNGERMANNIA, caule erecto, subdiviso foliis bifariis, inæqualiter bilobis, lobis conduplicatis, medio pallidis, apice serratis inferioribus majoribus, subcinctiformibus, superioribus oblongo-ovatis, acutis fructu terminatis, calycibus obovatis, cylindraceis; ore contracto, dentato.

Jungermannia albicans. LINN. *Sp. Pl.* p. 1599. *Syst. Nat.* ii. p. 706. *Fl. Suec.* p. 401. POLAKICH, *Pal.* iii. p. 189. WEIS, *Plant. Crypt.* p. 122. WARRA, *Specid. Fl. Gerd.* p. 143. ODER, *Enum. Pl. Fl. Dan.* p. 42. LEHR, *Herb.* p. 220. ALLIONI, *Fl. Pad.* ii. p. 313. SCOTCH, *Fl. Cur.* ii. p. 347. HORTMANN, *Germ.* ii. p. 64. ROTZ, *Germ.* iii. p. 391. LIGNY, *Scot.* ii. p. 717. HUDZ. *Angl.* p. 513. LINN. *Syst. Nat.* ed. Gmel. ii. p. 1330. WITT. p. 857. LAMARCK, *Encycl.* iii. p. 259. LAMARCK, *Fl. Fr.* ed. 2. v. ii. p. 436. LAMARCK, *Fl. Gall.* p. 20. *Engl. Bot.* t. 2240 and t. 1023 (the left hand figure).

Jungermannia varia. LINN. *Sp. Pl.* p. 1601. *Syst. Nat.* ii. p. 706. POLAKICH, *Pal.* iii. p. 199. SCHNEIDER, *Spic. Fl. Lips.* p. 104. ODER, *Enum. Pl. Fl. Dan.* p. 42. ROTZ, *Germ.* iii. p. 378. HUDZ. *Angl.* p. 516. WITT. p. 861. LINN. *Syst. Nat.* ed. Gmel. ii. p. 1332. LAMARCK, *Encycl.* iii. p. 285. MICHAUX, *Fl. Bor. Am.* ii. p. 279.

Lichenastrum Trichomania facie, capitulis e foliorum summitate emersentibus, minor. RAB. *Syn.* p. 112.

Lichenastrum foliis varis. RAB. *Syn.* p. 113.

Jungermannia repens, foliis cordatis, cristatis. MICHAUX, *Nec. Gen.* p. 9. t. 5. f. 9.

Hypoleucoides albicans, foliis pinnatis. VAILLANT, *Bol. Par.* p. 100. t. 12. f. 5.

Lichenastrum auriculatum, pinnulis angustis, pinnis recurvis. DILL. *Musc.* t. 71. f. 20.

Lichenastrum foliis varis. DILL. *Musc.* t. 73. f. 36.

β. procumbens, caule procumbente, foliis erectiusculis.

HAB. Abundant in England, Scotland, and Ireland, in various situations, though generally preferring a loamy soil in hedge-banks.—*β* was found in Scotland, by Mr. Dickson, upon a stiff clayey soil.

Obs. Fructification, both male and female, is produced plentifully in the spring and early summer months. If the weather prove moist. Gemmiferous plants are equally common throughout the summer.

PLANT. For the most part growing in large and densely crowded tufts, covering a surface of ground six or seven inches in diameter, at other times shooting up among flowers, and various species of *Jungermannia* in a more low and straggling manner.

The Roots. a general, originate from the lower part of the plant, and consist of minute filiform yellowish, simple tubules.

Stems erect from an inch to an inch and a half or two inches in length, simple, or once or twice divided in a dichotomous manner, and often producing innovations; they are firm and filiform of a pale yellowish-brown color, approaching to a red.

Leaves oblong and distichate, more or less closely placed, in their lower part compressed and slightly decurrent, divided from the extremity to within one third of the base, into two unequally-sized, complicated, appressed, vertical lobes, of which the inferior is the largest, and is half a line or more in length oblong, acute, plane, and a little curved on one side, so as to be somewhat asymetrical-shaped, the superior lobe, or lobule, differs from the one just described, in being only about half its size and of an oblong-ovate figure acute and by an even asymetrical-shaped. It is closely appressed, in a diagonal direction to the inner side of the larger lobe both are serrated at the point, though the lobule is so in a slighter degree than the lobe. The texture of the leaf is of two kinds, the greater part being composed of small cells, forming a very evident though minute sort of reticulation, whilst from the central base arises a pellucid mark which, branching off at the division of the leaf, forms the letter V (f 9) and disappears a little below the point of the lobes. In this mark the cells are seen to be extremely narrow cylindrical tubes, very much longer than those of the circumference of the leaf. The color is sometimes a deep but more frequently a pale, yellowish green, with a brownish tinge in those leaves which are nearest the extremity of the plant, and which thus appear as if scorched with heat. When dry the color is universally pale, and after having been long kept in the herbarium, becomes almost white.

Perigonal leaves (f 10) more crowded than the rest, and situated upon a swollen part of the stem (f. 6) they resemble the cauline leaves, except in having a ventricose base, where the anthers are placed, and the apex is not undequately much recurved.

The Perichetous leaves are large, and with their base entirely sheath the lower part of the style. Their lobes, too, are recurved at the apex.

Male Fructification (f f G. 10. 1.) I have seen upon the same plant with the female, as well as upon different individuals. The anthers are placed in clusters of three or four in the middle of each perigonal leaf, and are small approaching to round, strongly reticulated in the older ones, which in the younger anthers their appearance is scarcely perceptible. Their color is an olive-green before the emission of the pollen, afterwards white and pellucid. The *Stomata* are about the length of the anther white pointed.

BRITISH JUNGERMANNIÆ.

(*J. affinis*.)

FEMALE FRUCTIFICATION terminal.

Calyx a line in length, ovate, rather attenuated at the base. Inwards the externally longitudinally plicate, the mouth contracted and toothed. The reticulation is throughout formed of minute, somewhat ovate, reticles. The color is a yellowish green.

Calyptra ovate, reticulated, whitish, tipped with a stout hollow style, and surrounded at the base by a few short barren pistilla, which are a little swollen below, and are, throughout, both longitudinally and transversely marked with darker lines.

Peduncle three quarters of an inch in length, white, pellucid, shining, cellulose.

Capsule ovate, reddish-brown.

Seeds spherical, spiral filaments composed of a double helix both of a fulvous color.

The far β grows in distant and straggling patches; the stems, instead of being erect, as is usual with the plant, are prostrament and throw out a few radicles here and there from nearly the whole length of their under side.

The leaves are nearly erect and the whole plant is of a dull yellowish-red color.

Gemmae are produced upon the extremity of the terminal leaves, there lying in small scattered clusters, which are very soon dispersed. Each particle is somewhat spherical, with many acute projections at angles, of a pale yellow color and semi-transparent.

Of the *Jungermannia cespitosa*, which have their leaves divided into two unequal and unduplicate lobes, four species^a have been already described, according to general habit, as well as to the peculiar shape of the calyx, which is compressed, incurved, and truncate at the extremity. There is still another small family of the "*Jungermannia cespitosa, folio inaequaliter lobata*," which, though corresponding in many respects with the species just alluded to, nevertheless are found to differ from them essentially in the figure of the calyx. As in these it is cylindrical, erect, and plicate, and its mouth is contracted and dentated. Of such, I can mention, with certainty, one species alone, the subject of the present description, which has fallen under the observation of preceding writers: but two others, which I have named *J. obtusifolia* and *J. Duranii*, have lately been added to the British list, and will soon make their appearance in this work. From these, *J. affinis* may be readily enough distinguished, by its much larger size, as well as by two marks still more decisive: one of which is to be found in the serratures of the leaves: the other in the pellucid forked nerve, which, originating in the base of the leaf, occupies the centre of both lobes, and vanishes a little below their points. The difference in the shape and size of the cellules, which is the cause of this appearance, is, as far as I have had the opportunity of observing, peculiar to this species of the genus, and, although very evident, and observable even with the naked eye. It has not, that I am aware, been noticed by any author, except Weis, who well remarks of the leaves, that "*per lentem nervo quam divisa sunt et serrata.*"

A celebrated French Botanist, M. Paillet Braconot, has not only endeavored to controvert the Hedwigian system with regard to the sexual organs in mosses, but in the same *Reperaire*,

^a *J. armorea*, *J. undulata*, *J. rufopennis*, and *J. umbrosa*.

Manall's figure and description are extremely superior and, according to the character that is given of the larva, more rather to being a *J. marginata*, than to others, but the only is slightly different. But, indeed, upon the figure to his *J. marginata*, a species, which, by means of authentic specimens, that I have lately received from Mr. Bampf, I am enabled to say is differing more than *J. marginata* of this Monograph. To that point, therefore, the following specimen may be added *Jeuneonema marginata* Kütz., Germ. iii. p. 375.

[illegible][illegible]

BRITISH JUNGERMANNIÆ.

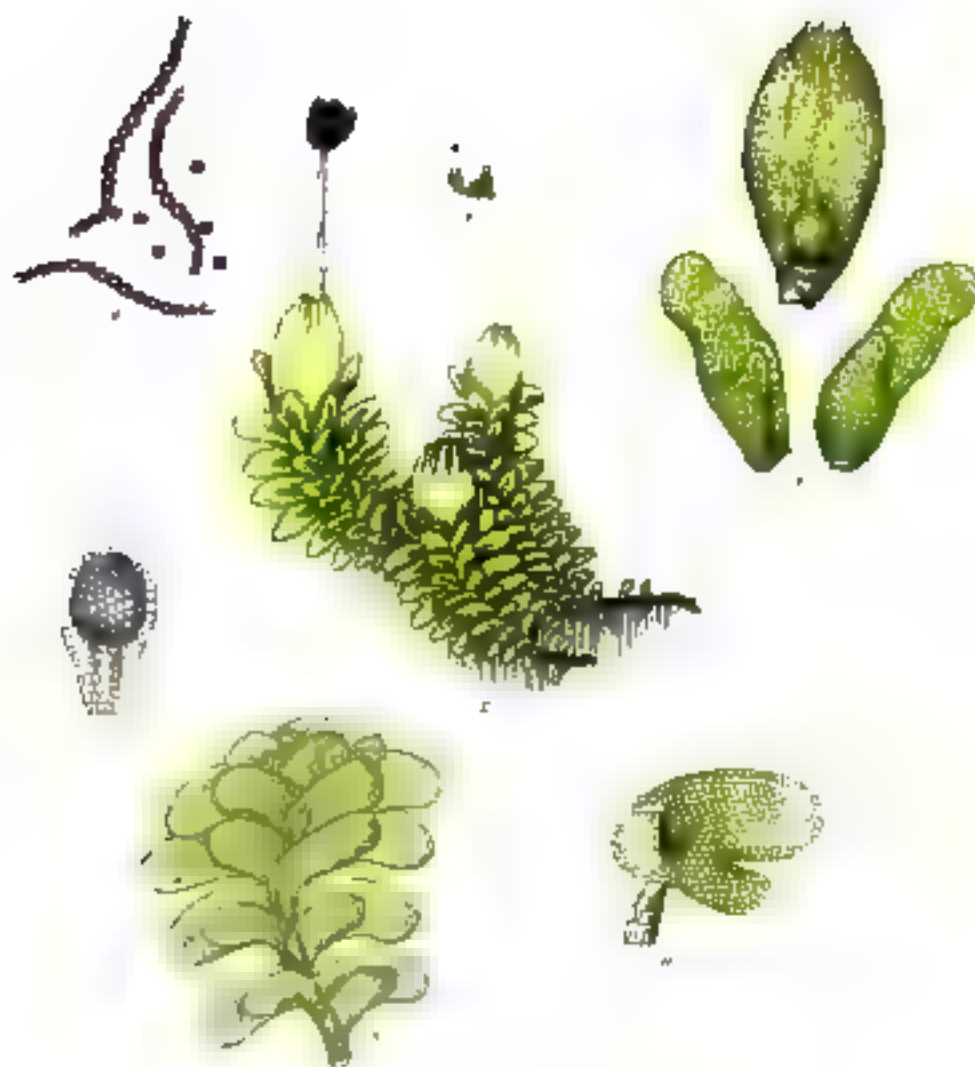
(*J. albicans*.)

REFERENCES TO THE PLATE.

FIG.

1. Male plants of *J. albicans*, natural size.
2. Female plants, natural size.
3. Sterile plants, natural size.
4. β of *J. albicans*, natural size.
5. β magnified 6
6. Extremity of a male plant, having young shoots 6
- 7 } Leaves 4
- 8 } 4
9. Leaf with the upper lobe, or lobule, expanded to show the nerve 4
10. Perigonal leaf 4
11. Young anthers 1
12. An old wither 1
13. Female plant 6
14. Calyx, longitudinally dissected 6
15. Interior view of a perichetial leaf 4
16. Exterior view of a perichetial leaf 4
17. Calyptra and barren pistilla 3
18. Barren pistilla 2
19. Barren pistillum 1
20. Seeds and spiral filaments 1





Jungermannia obtusifolia

BRITISH JUNGERMANNIÆ.

(*J. obtusifolia*.)

JUNGERMANNIA OBTUSIFOLIA.

(TAB. XXVI.)

Jungermannia, caulis ascendente, simplici foliis bifariis, inæqualiter bilobis, lobis nonduplicatis, obtusis, integerrimis, inferioribus majoribus, subclaviformibus, superioribus ovalis; fructu terminali, calycibus obovatis, ore contracto dentatis.

Jungermannia foliis pinnatis, ovalis, confertis, ex apice steriferis. Hall. *Hab.* 17. p. 819
(*Artichus spongia*.)

Hab. Near Heddon on the Wall, Northumberland. *Mr. Thorskill*.—Very rare in Ireland, where *Mrs. Hutchins* has discovered it only in one spot, near Banley.

Obs. It bears fructification in March and April.

PLANT growing in densely-matted tufts, two or three inches in diameter, firmly attached to the soil, by means of their numerous, thick

Roots, which consist of simple, pellucid fibres, and issue most copiously from every part of the

Stems these are ascending, or, when much crowded, nearly erect, seldom exceeding three or four lines in length, simple, though there is often an appearance of their being branched, from young shoots, which are not unfrequently produced towards the extremity of the plant. the color is a dirty green, more or less approaching to a pale brown.

Leaves bifarious, distichous, and horizontal, rather closely imbricated, so much so, as entirely to conceal the stem; they are smallest at the base, larger and more crowded at the apex, particularly of the sterile plant, from a quarter to half a line long, somewhat of a roundish figure (supposing the leaf to be expanded ? 4.), divided about half way down, from the extremity, into two, unequal, conduplicate, vertical lobes, of which the inferior is the largest, oblong, and a little curved on one side, so as to be scimitar-shaped; the superior, or lobule, is ovate, or oblongo-ovate, in the upper ones, and is closely appressed, in a diagonal direction, to the larger portion of the leaf; both are remarkably obtuse at their apices and rounded, their margins every where entire, except, indeed, in a few of the terminal leaves, which, under a high power of the microscope,

may be seen to be obscurely crenate. The *reticulation* is small, formed by roundish *cellules* of nearly the same size throughout. The color of the leaves a pale green, becoming still paler after having been kept for some time in the Herbarium.

Perigonal leaves very closely imbricated, and placed at the extremity of the plant, much inflated at the base; at their apices, both in the lobes and lobules, recurved.

Perichætal leaves (f. 6) larger than the rest, and more erect, a little waved at their margins; with their almost cylindrical base, they entirely envelop the lower part of the calyx.

Male Fructification always, as far as my observation enables me to judge, upon distinct plants from those which produce the female. The *stamens* are situated in small clusters in the axilla of the perigonal leaves, and upon short white footstalks. They resemble, in every respect, those of *J. albicans*.

Female Fructification on constantly, in reality, terminal, though the shoots or innovations, before alluded to, as originating not unfrequently from the extremity of the stem, often take their rise immediately below a calyx, and thence make it seem lateral.

Calyx (f. 5) ovate, or rather obovate, erect, plumbe in its upper half, the margin contracted, and cut into several small, sharp teeth. In color and texture the calyx resembles the leaves, except that in a more advanced state it is white and scarious at the orifice.

Calyptra obovate, whitish strongly reticulated, so transparent that the young capsule and its peduncle may very distinctly be seen within it (f. 7). *Style* short and tubular.

Barren pistilla seven or eight in number, linear, faintly striated both longitudinally and transversely.

Peduncle two or three lines long, white, shining, succulent cellulose.

Capsule ovate, approaching to round, of a deep reddish-brown color. It divides into four equal, ovate, and obtuse valves, and discharges its numerous

Seeds and spiral filaments (f. 8) of a fulvous color, the former spherical, the latter composed of a double helix.

I cannot quote the Hallerian synonym, above alluded to, without entertaining considerable doubts as to the propriety of my doing so: since the description is of such a nature, that little can be collected from it to aid our conjectures, and the references given by the author all belong to quite a different plant. Haller, indeed, observes, that the leaves are "*paulum mucronulæ*," and farther says of his species, "*ad Jungermanniam DILL. 20. (J. albicans, proxima) accedit, sed foliis differt rotundioribus.*"

The entire margins of the leaf in *J. obtusifolia* (or, at most, their being only very slightly crenated in a few that are situated at the extreme part of the stem), the want of the pellucid central mark, and the diminutive size of the whole plant, will always distinguish it from *J. albicans*, as will the obtuse and rounded ends of the lobes from *J. Dicksoni*.

BRITISH JUNGERMANNIÆ.

(*J. obtusifolia*.)

We owe the discovery of this plant to Mr. Thornhill, of Gateshead, near Newcastle, who found it in 1805. Miss Hutchins has since met with it in Ireland, in greater plenty and perfection, yet, even here, it is confined to one spot. The male and female fructification are neither of them of rare occurrence, though I was not so fortunate as to be acquainted with the former, before the engraver had finished the plate. The individuals producing anthers are rendered conspicuous by their swollen apices. Calyxes seem to be abundant throughout the year, and it appears that they remain upon the plant long after the peduncle and esquire have decayed.

REFERENCES TO THE PLATE.

NO.

1.	<i>J. obtusifolia</i> , female plants, natural size		
2.	The same, magnified	.. ..	6
3.	Extremity of a sterile stem	+	4
4.	Leaf, with the lobes expanded	.	3
5.	Calyx		3
6.	Perichætiæ		3
7.	Calyptra, enclosing the young capsule	.. .. + . + .	2
8.	Seeds and spiral filaments	. ....	1





Sargassum emarginata

BRITISH JUNGERMANNIA.

(*J. emarginata*.)

JUNGERMANNIA EMARGINATA.

(TAB. XXVII.)

JUNGERMANNIA, caule erecto, remoso: foliis bifariis, laevi subricatis, patentibus, obcordatis, emarginatis fructu terminali; calycibus ovatis, perichaetis immixtis.

Jungermannia emarginata. EMMERT, Beitr. Bot. iii. p. 80. SCHWABER, Samml. ii. p. 4. SCHWABER, Spic. Fl. Germ. p. 75. HORTSMANN, Germ. ii. p. 89. ROTH, Germ. iii. p. 307. Engl. Bot. t. 1022. LICH. Syst. Nat. ed. Gmel. v. p. 1349.

Jungermannia macrospora. DICKSON, Crypt. Fung. iv. p. 16. t. 5. f. 10. LICH. Syst. Nat. ed. Gmel. ii. p. 1349. WITTR. iii. p. 654.

HAB. Plentiful in the alpine districts of England, Scotland, and Ireland, delighting in very wet places; even in the waters of rapid torrents, and in situations where it is continually exposed to the spray of a water-fall. It bears fructification in the early months of summer.

PLANT growing in large patches, more or less densely crowded.

Roots proceeding almost entirely from the lower and leafless part of the stems, from half to three-quarters of an inch long, nearly as thick as human hair, rigid, often branched.

Stems from one to three, or even four inches long, filiform, or increasing somewhat in size towards the extremity, erect, sometimes simple, but more frequently once or twice bifid, with segments of uncertain length, and, besides, producing innovations, which are either lateral, or originate, in clusters of three or four, from the bosom of the terminal leaves. their texture is somewhat lignous; when dry, very brittle.

Leaves from a quarter to half a line long, at the base of the plant almost always much decayed, but more perfect, and of a larger size, towards the centre of the stem. they are bifarious and distichous, laevly subricatis, patent or erecto-patent, nearly obcordate (f. 5), semimplexicaul at their base; the lateral margins, especially that part of them which is nearest the stem much incurved, the apex divided by a rather deep and acute notch, into two very obtuse rounded segments the texture rather firm. the cells are extremely minute, rounded. the color exceedingly variable in different situations, in less moist, but more exposed places, it is generally of a deep brownish purple hue; when found in rivulets, as Dr. Smith well observes, it loses its purple tints and becomes dark green.

The *perigonial leaves* differ in no respect from the rest, except in having a *ventricose base*.

Perichætal leaves attached to the exterior surface of the calyx on which they grow, and surround it on all sides, so as entirely to conceal it. They are erect and smaller than the cauline leaves, but, in other respects, much resembling them; the inner ones, however, are less deeply emarginate.

MALE FRUCTIFICATION situated in the axilla of the perigonial leaves, and mostly near the extremity of the stem. *Anthers* (f. 6 ?) spherical, reticulated before the discharge of the pollen of a pale dirty-green afterwards a yellow-brown. The *footstalk* about the length of the anther, white and transversely striated.

FEMALE FRUCTIFICATION terminal.

Calyx (f. 8) ovate, immersed in the perichætal leaves, of a thick carnosæ substance. In consequence of the united bases of these leaves, the mouth alone free and membranous, and, as may be seen by a careful section of the calyx and its covering, cut into six or eight rather large teeth two of which, I have, in several instances, observed to arise from a larger interior appendage, somewhat resembling a leaf, but much narrower, plane, and strongly emarginate at the extremity.

Calyptra ovate, whitish, delicate, reticulated, surrounded at the base by a few abortive *stamella*.

Peduncle seldom exceeding half an inch in length, white, shining, transversely and longitudinally striated, terminated by a roundish

Capitulum of a brown color, furrowed on its exterior surface, and opening into four equal ovate valves.

Seeds (f. 10) spherical, fulvous, accompanied with spiral filaments of the same color, composed of a double helix.

It is remarked by Dr. Smith, in *English Botany*, upon the authority of the Linnean Herbarium, that this species was first found and named by Dr. Swartz, many years before it was published by Ehrhart. The same eminent Swedish Naturalist, who has sent me many specimens, has, further, looked upon the luxuriant and dark green appearance of this plant as a distinct variety, and in his manuscript has named it *β. aquatica**. Yet, notwithstanding such high authority, I find intermediate states of the plant so common, and the gradations between them so imperceptible, arising solely from the greater or less degree of moisture with which they are supplied, that I am induced rather to include the *β* of Swartz in my general description. I may follow his example in separating it. The name given to this species by our countrymen, Mr. Dickson who published it as new in his second fasciculus, is so expressive of one of the most obvious of its characters, that there is much reason to regret the necessity of laying it aside.

* Dr. Schröder also describes what he considers a singular variety, found by him in the Hercynian Forest, in the following terms: "Hypoxis insignis varietas in Montibus sylvestribus saxis procreant, quæ sæpius fruticosa, ramosioribus, et uocellæ ad truncatum longitudinem procreant, et folia laciniosæ acie elatis distinguitur." *Spec. Fl. Germ.* p. 34.

Dr. Schrader mentions having seen capsules occasionally lateral, which Dr. Roth attributes to innovations of the stem, an opinion (in which I am the more inclined to coincide, since I have at this moment, before me, a specimen from Mr. Lyell, which has young fructification, and, immediately below the calyx, a cluster of three or four young shoots, arising from the axilla of a leaf. These would, in the course of a little time, have given such an appearance of a continuation of the stem, that the fructification might, without a careful inspection, have been supposed to be lateral. The same author also describes the stems as really simple, and merely taking the appearance of being branched from their annual innovations, in which he is also probably right.

Besides the singularly large and branching roots, already noticed, of *J. emarginata*, the shape of the leaves (which Ehrhart aptly compares to a heart cut out of paper) and the immersed calyxes, afford characters so decisive, that this may be considered as a species the most distinct of any in the genus. In general habit, indeed, and somewhat in the shape of its leaves, it has an affinity with *J. coccinea*, but so slight a one, that it will be needless for me to enlarge more upon the subject.

In August, 1808, Mr. Barrer and myself found, upon the summit of Ben Nevis, small specimens of this plant, whose calyxes contained two, and sometimes three, fertile gemmæ, and, what was more remarkable, capsules of very diminutive size, situated upon peduncles so short that they were not equal to the length of the calyx; yet these capsules were fully formed, and some of them were even discharging their seeds and filaments whilst under the microscope. This appearance is represented at F. 11.

REFERENCES TO THE PLATE.

FIG.

- | | |
|--|---|
| 1. Male plant of <i>J. emarginata</i> , natural size. | |
| 2. Sterile plant, natural size. | |
| 3. Female plant, natural size. | |
| 4. The same, magnified | 6 |
| 5. Leaf | 4 |
| 6. Perfect anther | 1 |
| 7. Anther, after it has discharged its pollen | 1 |
| 8. Interior of a calyx | 4 |
| 9. Calyx and perichætal leaf | 5 |
| 10. Seeds and spiral filaments | 1 |
| 11. Receptacle, with the calyx torn away to exhibit the small capsules | 3 |





Jungermannia ventricosa

JUNGERMANNIA VENTRICOSA.

(TAB. XXVIII.)

JUNGERMANNIA, caule prostrato, subramoso foliis patentibus, subquadratis, obtusè emarginatis, lateribus incurvis fructu terminali, calycibus subæmericis, demum oblongo-ovatis, ore contracto, pilicatis, dentato.

Jungermannia ventricosa. DICKS. *Plant. Crypt. Foss.* i. p. 14. WITM. p. 85d. LEX. *Syst. Nat.* ed. Gmel. ii. p. 1349.

Jungermannia bidentata. γ *globulifera*. WRENN, *Spic. Fl. Goet.* p. 134.

Jungermannia bidentata. SCHMIDT, *Dis. Jung.* p. 102, f. xrv.

Jungermannia globulifera. POLLICH, *Pol.* iii. p. 192? TINEU *Prodr. Flor. Neap.* v. 865.

(*vide* ROTZL.) KORN, *Germ.* i. p. 379.

Jungermannia bicornis. HOFFMANN, *Germ.* ii. p. 89. *Fl. Dan.* t. 888. b. (non. n.)

Minum foenum. NACK. *Meth. Musc.* p. 437.

Jungermannia minor, *repens*, foliis subrotundis, bifidis, vaginâ foram cylindricâ. MICHAEL, *Nov. Gen.* p. 8. t. 8. f. 13.

Jungermannia minima, *repens*, foliis bifidis, vaginâ foram ventricâ. MICHAEL, *Nov. Gen.* p. 8. t. 5. f. 15.

Lichenastrum, quod *Jungermannia minima*, *repens*, foliis bifidis, vaginâ foram ventricâ. DILL. *Musc.* i. 70. f. 14.

Jungermannia foliis imbricatis, luxurpidotis, globuliferis. HALL *Helv.* iii. p. 59.

HAB. In woods. *Mr. Dickson*.—Not uncommon in various parts of the kingdom. (The *Rev. Mr. Francis* has, for many years, noticed it in the neighborhood of his residence attached both to a boggy and lumpy soil, in Hock wood and Lows, as well as in Edgelyield wood, and on the heath growing also among *Sphagnum*.)

Mrs. Hutchins has discovered fructification in the month of November, about Bantry where it continues in fruit but for a few days. *Dr. Taylor* finds it upon Bonlacross mountain, with capsules, in May; and *Mr. Mackay*, at the same time, near Dublin, with calyxes, in which state, indeed, it is not uncommon, during most of the spring months.

In the early part of summer, principally, the *Gemmae* are produced; though *Mr. Lyell* finds them in great perfection in the month of August, and even in the beginning of September.

PLANT growing sometimes in densely-wooded patches, at other times singly, creeping among *Sphagnum latifolium* and *capillifolium*, or *Pictetum glaucum*.

Root consisting of rather thickly-placed, whitish, simple fibres, shooting out from nearly the whole length of the under side of the plant.

Stems from half to three quarters of an inch in length, and the tenth of a line in diameter, prostrate, flexuose, rarely simple, more frequently once or twice branched, with the branches having the appearance of being again divided, in consequence of the innovations they are of a green color, sometimes approaching to a brownish-black, and I have lately received specimens from Mr. Ljell, in which both the stems and roots have a deep purple tinge.

Leaves rather closely placed, though scarcely imbricated, bifarious, distinct, patent, or even occasionally reflexo-patent, with the lateral margins always more or less incurved (f. 4), about a quarter of a line in length, of a subquadrate figure, divided at the extremity by a wide and obtuse notch, of which the points or segments are acute, and, in the extreme leaves, sometimes involute. The lower ones, it is to be remarked, are cleft into three (f. 5) or which is more rare, four teeth (f. 6) or segments, which are frequently of unequal size. The texture is rather delicate, the *cellule* small, roundish; the color a pale green, assuming more or less of a brownish tint, in much exposed situations.

The perigynial leaves do not differ from the rest (f. 9).

Perigynial leaves (f. 7) closely embracing the style, cut at their extremity into three, four, and even five acute, and large, but unequally-sized teeth.

MALE FRUCTIFICATION. Anthers (f. 8, 9, 10, 11) situated, two or three together, in the axilla of the terminal leaves. Hitherto I have only observed them on distinct individuals from those which bear female fructification. The form of each anther is ovate, or rotund-ovate. The older ones are of a greenish ash-color, and strongly reticulated. The *foveolæ* is about half the length of the anther, white, and marked with transverse lines.

FEMALE FRUCTIFICATION terminal, though very frequently, as is represented in the plate, it has the appearance of being lateral (f. 3), from young shoots*, which arise immediately beneath it.

The calyx is remarkable for being in its early state of a spherical figure (f. 3), and I was unfortunately not acquainted with the fructification in a more advanced period of its growth, till a long time after the plate was engraved. By specimens, however, which I have lately received I am enabled to add that the calyx, at the time it produces capsules, is oblongo-ovate at all times plicate towards the extremity. The mouth is contracted and minutely toothed.

Calyptra ovate, whitish, tipped with its tubular style.

Barren peristoma (f. f. 4, 16) six or seven in number, linear, of a greyish color, longitudinally marked with reddish lines, their apex a little expanded.

Pedicels from a quarter to half an inch long, white, shining, transversely and longitudinally striated.

* Probably Michx. was deceived by this circumstance. His figure, however, gives the idea of the calyx being sessile in the centre of a plant that is branched in a scissured manner, which is not the case in any species that I am acquainted with.

BRITISH JUNGERMANNIAE.

(J. reticulata.)

Capsule ovate, deep brown, furrowed.

Seeds and spiral filaments of a fulvous brown color; the former exactly spherical, the latter composed of a double hull.

Obs. The spherical clusters of gemmae (f. 12), which form one of the most striking features of this species, are situated at the pinnæ of the terminal leaves, both of the main branches and of the young shoots. They are, when perfect, so compact as to resemble little pale yellow-green balls—when scattered about, however, they are found to be composed of extremely minute, angular pellucid granules (f. 13).

Few Jungermanniae seem to be less understood than the present species, which, indeed, is not much to be wondered at, when we consider the close affinity it bears with *J. exarata*, from which it may be distinguished by its larger size, more branched habit, the involute margins of the leaves, and the abundant and very conspicuous granaceous globules. Of this species the capsules are extremely rare, though calyxes are frequently to be met with, which, like the sterile calyxes of *J. rufota*, fall from the plant with a very slight touch.

Mr. Dickson first discovered this species in Britain, and ascertained it to be the "*Jungermannia minima, repens, foliis bipinnatis, vaginis floribus testaceis*" of Michx., and it appears to me that the "*Jungermannia minor, repens, foliis subrotundis, bipinnatis, vaginâ floribus cylindricis*," of the same author, may be referred to with equal propriety. With regard to the figures, they cannot certainly be considered as accurate representations of the plant; and what Michx. says of f. 15, applies also, to f. 2, "*Ipse planta duplâ minor est quam exprimit icon.*" The gemmae are particularly ill done, and seem to indicate that the clusters are supported by a footstalk. Dillenius has done no more than copy the Michelian figure and description. Roth, under his *J. globulifera*, has, as it appears to me, and as I have already had occasion to mention, described three species, the present *J. exarata*, and *J. sericea*. Pollich's plant above quoted might, perhaps, rather be referred to under this species, than under *J. bicuspidata*, where I have also quoted it, though in both instances with a mark of interrogation. I have inserted Thunberg's *J. globulifera*, as a synonym, solely upon the authority of Roth. The plant of Haller can hardly be doubted especially as he quotes f. xiv. of the *Disco Jung.* of Schumöler, which I think may with equal certainty be said to belong to *J. ventricosa*. The excellent writer last mentioned has, nevertheless, confounded it with *J. sibirica*, and Weber has made it his var. γ , of the same species. Haller and Weber say that they have observed the globules of the gemmae to be confined to one point of the leaf, whilst Necker very justly remarks, that they are common to both.

REFERENCES TO THE PLATE.

fig.			
1		Male plants of <i>J. dentricosa</i> , natural size	
2		Female plant, natural size.	
3		Female plant magnified	6
4		Leaves	4 and 5
5	}	Lower leaves	4
6			
7		Perichætiat leaf	4
8		Portion of a male plant, with gemma	6
9		Perigynial leaf and anthers	4
10		Small anther	1
11		Anther arrived at its full size	1
12		Terminal leaf with gemmiferous balls	4
13		Particles of the gemma	1
14		Calyx, longitudinally dissected	3
15		Barren pistilla	1





Jungermannia toruori

JUNGERMANNIA TURNERI.

(TAB. XXIX.)

JUNGERMANNIA, surculo procumbente, flexuoso, stellatum ramoso foliis lato ovalis, acutè bipartitis segmentis sphenoduplicatis, spinuloso-dentatis fructu terminali; calycibus linearibus, longitudinaliter plicatis, ore denticulato.

HAB. Shady bank of a mountain-rivulet near Bantry *Miss Hutchins.*—(It bears fruit most plentifully about the beginning of March.)

This rare PLANT is found growing in small, pale, yellow-green patches, of one or two inches in diameter.

The *Roots*, which consist of minute, whitish, simple fibres, descend from the under side of the plant, in various places, but chiefly from its centre, and immediately below the insertion of the calyx (f. 8.)

A single individual scarcely exceeds three or four lines in length. The *surculi* are procumbent, divided from a centre, with branches extremely slender. *Stipulae*, flexuose, mostly simple, but sometimes again irregularly divided. Their color a very light green; their substance diaphanous, filled with somewhat ovate cellules, placed at a distance from each other.

Leaves (f. f. 3, 4, 5) arranged at very regular intervals and somewhat closely, in two rows, patent, about the twentieth of a line in length, or a little less towards the extremity of the barren shoots, though the reverse is the case with those leaves that approach the calyx. Each is, at its base, semimplexicaudal, of a lato-ovate figure, divided from the apex, for about one half of its length, by an acute sinus, into two ovate or lanceolate sharp and almost conduplicate segments, which, at their margins, are remarkably and elegantly fringed with rather large spiniform teeth of unequal size. The color of the leaves is an extremely pale yellow-green, the cellules are ovate, and, as in the surculus, placed distantly, yet in regular longitudinal series.

Perichætal leaves (f. f. 6, 7) closely imbricated on all sides of the calyx, and differing from the cauline ones in being of a quadrate figure, frequently broader than they are long, and in being cleft for only about one third of their length, into three or four ovate, acute, spinuloso-dentate, erect segments.

Male Frustrification unknown.

FEMALE Frustrification terminal upon the auricle.

Calyx linear-oblong, about one third or even half a line in length, longitudinally, yet slightly, plicate or obtusely angular, in a young state a little incurved, at a more advanced period, erect, its color almost white, having, however, generally, a yellowish tinge.

The *cellulae* are oblong, and, as in the rest of the plant, rather distantly placed.

Germs (f. 8) ovate, attenuated at the base, tipped with a short style.

Carpina (f. 9) ovate, reticulated, brownish-white.

Pedicels a quarter of an inch long, white, succulent, cellulose.

Capsule (f. 10) ovate, brown, splitting into four valves of equal size.

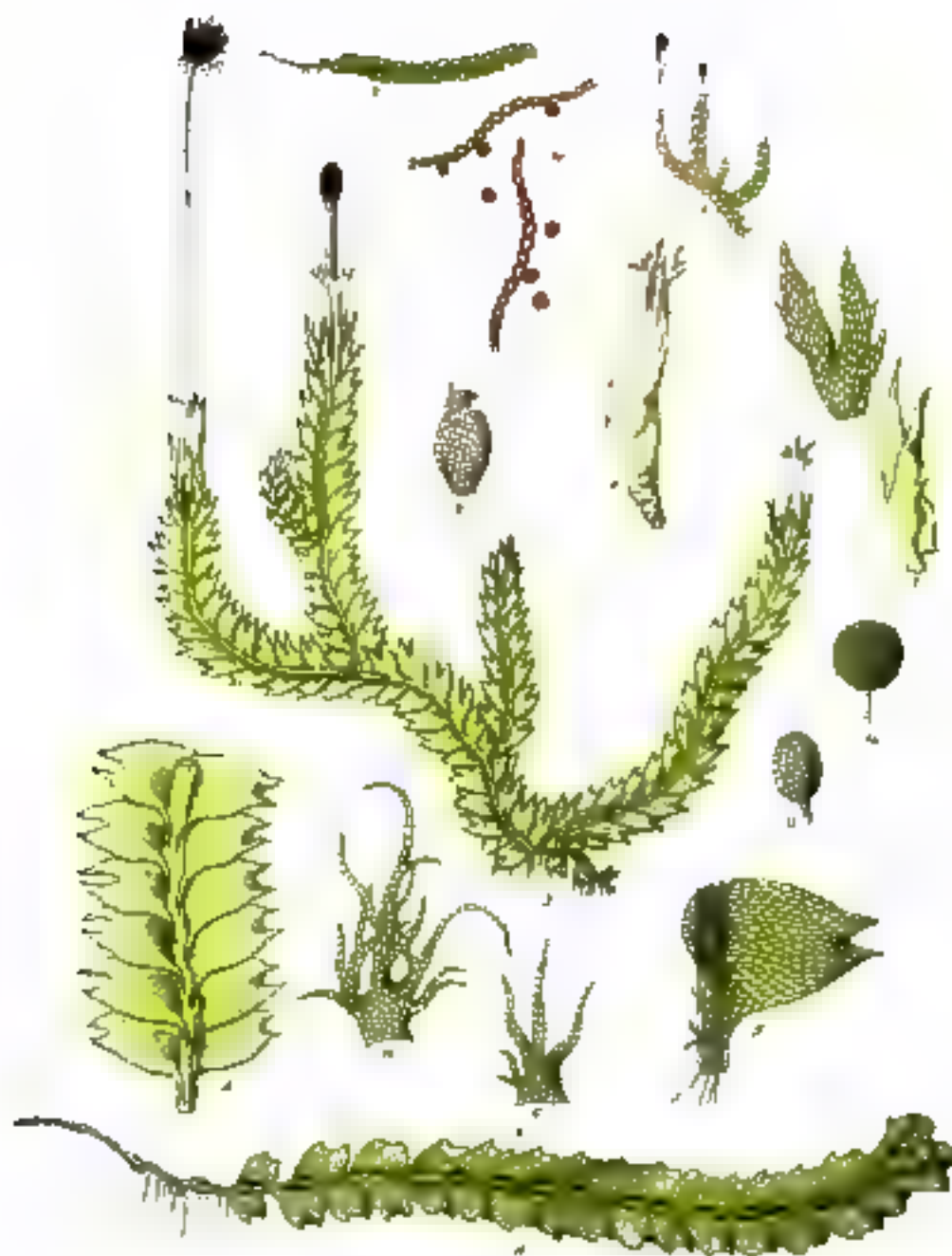
Seeds and spiral filaments (f. 11) fulvous, the former spheroidal and smooth, the latter composed of a double series.

Throughout the progress of this publication, I cannot promise myself a more grateful task, than that of dedicating a small but most elegant species of my favorite genus to Dawson Turner, Esq., as a memorial of the great and undiminished kindness which I have for many years received from him. To his friendly advice and instructions the present work is indebted for whatever merits it may possess. *J. Turneri* has hitherto been found alone in the neighborhood of Bantry, and is one of the many interesting additions that have been made to the Cryptogamic Flora of the British Isles, by Miss Hutchins. It is not a little remarkable that this is the second species of *Jungermannia*, discovered by this lady, that is distinguished from all the rest of its affinities (which, in the present instance, I need hardly say are *J. discipulata*, *J. byssacea*, &c.) in having the leaves dentate in a very conspicuous and strikingly beautiful manner. The further plant of this description is *J. Hutchinske*, represented on the first plate of this Monograph, and I have, on this account, the greater pleasure in affixing to the species the names of two botanists, who have alike rendered themselves celebrated by their knowledge and discoveries.

Besides the dentate leaves, there is another peculiarity possessed by the present plant, that I have not observed in any other of the genus: this is in the large-cellula with which the whole of the foliage and auricle appear to be studded, in the same manner as the leaves of *Dicranum polytrichum* and a few other mosses; for, though these are distantly placed, they are, nevertheless, arranged in longitudinal and parallel lines.

REFERENCES TO THE PLATE

1.	<i>J. Turneri</i> , female plant, natural size	
2.	The same magnified	6
3.	Portion of the caudex and leaves	4
4, 5.	Cauline leaves	3
6.	Exterior perichætal leaf	3
7.	Interior perichætal leaf	3
8.	Excipiente of the fructification, with the leaves removed, to exhibit the relics of a portion of the muscæ	3
9.	Culpebra	3
10.	Borren pistilla	2
11.	Seeds and spiral filaments	1



Jungermannia bidentata

JUNGERMANNIA BIDENTATA.

(TAB. XXX.)

JUNGERMANNIA, caeruleo procumbente, ramoso: foliis latè ovatis, decurrentibus, bifidis segmentis valde acutis integerrimis, stipulis bi- tri- fidis laciniatisque: fructu terminali; calycibus oblongis, subtriangularibus, ore laciniato.

Jungermannia bidentata. Lenz Sp. Pl. ii. p. 1806. Syst. Nat. ii. p. 706. POLLICH, Pol. ii. p. 180. SCRODII, Cern. ed. 2. i. p. 349. LAMÉ, Herb. p. 249. *fecul. var. β*, J. WEIN, Plant. Crypt. p. 115. *fecul. var. β*, J. WERNER, Spic. Fl. Oest. p. 133. *fecul. var. β*, γ, δ, J. WILLD. Ber. p. 340. ODER, Enum. Pl. Fl. Dan. p. 41. ALLIONI, Fl. Ped. ii. p. 312. VILLARS, Delph. i. i. p. 924. SCHUBERT, Spic. Fl. Lips. p. 104. HOFFMANN, Germ. ii. p. 89. ROTH, Germ. i. i. p. 392. *fecul. var. β*, J. REICH, Cern. p. 433. HEDR. Angl. p. 511. LACINTE Scot. i. p. 773. WITH. ii. p. 863. *fecul. var. β*, J. LENZ Spic. Nat. ed. Germ. ii. p. 1348. LAURANCE, Foryet Bot. iii. p. 279. Engl. Bot. i. 626.

Lichenastrum trichomanis facie, foliis bifidis, major. RAI Syn. p. 113. n. 19.

Jungermannia major, *reperit. foliis bifidis*. MICHXII, Nov. Gen. p. 8. t. 5. f. 12.

Hepaticoides Potytrichis facie, foliis bifidis majoribus. VAILLANT, Par. p. 90. n. 3. t. 19. f. 8.

Lichenastrum pinnatis acutioribus, *romanticis. bifidis, major*. DILL. Musc. t. 70. f. 11.

Jungermannia foliis bifidis, in ramis florifero majoribus. HALL. Hede. iii. p. 62. n. 1977.

β. ovatus, foliis obtusè emarginatis, atro-viridibus, stipulis multifidè divisis.

HAB. Very plentiful in moist and shady situations, upon hedge-banks and trees, particularly among moss.—β is found by the Rev. H. B. Francis in very wet and boggy parts of Holt Heath. -α abounds with calyces during the greater part of the year. Male fructification has been found by Mr. Lyell and myself in great perfection in the months of October and November.

PLANT growing in more or less crowded patches of some inches in diameter.

Roots small whitish fibres, proceeding here and there from various parts of the under side of the percell, generally however, immediately below a stipule (f. 5)

Stems from an inch to an inch and an half long, procumbent, flexuous, branched, with the branches often erect towards the extremity, simple, or occasionally producing a short lateral shoot; their color varies from a pale, to a deep, and almost black green, in certain situations, the texture is rather firm, the cells compact.

Leaves (f. 2 & 5) from half to three quarters of a line or even more in length, closely placed, but scarcely so much so as to be imbricated, in a bifarious manner, plane, or very slightly waved, horizontal, of a widely ovate* figure at the base, half surrounding the stem, and having the lower margin very much decurrent, at the extremity they are divided for about one fourth or one fifth of their length, with a sinus more or less acute, into two, equal†, sharp, and straight segments, the tips of which resemble minute cilia or teeth, whence the plant has its name. The color of the leaves is always a singularly light green, sometimes almost approaching to white, the texture thin, the cells large, and bounding, with their lacunæ, a beautiful sort of reticulation.

Perigonal leaves about ten or twelve in number, either placed quite at the extremity, or at the middle of a branch, ventricose, rounded, and being closely imbricated over one another in two rows, as is the case with those of *J. apiculata*; in like manner, also, their apices are recurved, and divided into two, three, or even four sharp and often unequal segments.

The *Perichætal leaves* (f. 7) may be said to commence with the second pair of leaves from the calyx, which, however, scarcely differ from the rest except in being longer and more inclined to be erect; the first pair are twice the length of the radical leaves, quite erect, and appressed to the calyx, deeply divided into two, equal, lanceolate segments, which are here and there dentate or ciliate on the margins.

Stipulae (f. 8) one to every pair of leaves, appressed to the under side of the rachis, oblong, generally divided into two, and sometimes three, principal segments, which are variously lacinated.

The **MALE FRUCTIFICATION**, which I was not fortunate enough to possess in a good state, till it was too late to add it to the figure, is readily discovered by the singular disposition of the perigonal leaves, in the middle of each of which are situated two or three spherical or somewhat ovate anthers, terminating short white, transversely striated *filaments*.

FEMALE FRUCTIFICATION terminal upon the summit and upon the small lateral shoots.

Calyx (f. 6) about a line long, sometimes slightly incurved in an early state of the fructification, ovato-oblong obtusely triangular, the mouth, though slightly contracted, previously to the emission of the capsule, is afterwards somewhat expanded, it has a rather deep incision on one side, and is bordered with numerous lacinae. The texture and color of the calyx scarcely differ from those of the leaves.

Calyptra (f. 9) pale brown, thin, reticulated, style short, tubular.

* Weber describes the leaves to be "ex ovato subquadratis," which does not exactly correspond with those of our plant.

† According to Dr. Smith's figure and description, in *English Botany*, it would appear that the segments are occasionally of unequal size. I have never examined them to be in myself.

BRITISH JUNGERMANNIE.

(*J. bidentata*.)

Peduncle about three quarters of an inch in length, white, succulent, cellulose. a little waved when it has reached its full height.

Capsule exactly oval, deep brown, longitudinally and transversely furrowed, splitting, at maturity, into four equal valves.

Seeds and spiral filaments (? 113) of a rich, fulvous brown. the former spherical, the latter composed of a double helix.

β I am induced to notice as a distinct variety, because, among the many specimens I have examined, I have scarcely found any differ at all from the figure here given. It is generally of a larger size than α, and simple; the stem and leaves darker. the latter slightly concave and obtusely emarginate at the extremity, with the points or segments more or less blunt. The stipules, too, I have always remarked, are more irregularly divided into more numerous laciniae.

J. bidentata may be reckoned among the most common of the tribe, and I was formerly of opinion that it might also be considered as one of the most distinct, till my friend, Mr Francis, pointed out to me the Var β growing in the vicinity of his residence and Miss Hutchins kindly communicated a plant, which, though it has many peculiarities in common with the present species, yet has marks of discrimination so striking, that I am induced to reserve a more full description of it for another part of this publication. It will be sufficient in this place to observe that it is distinguished from *J. bidentata* in having the leaves cut into three, more frequently than into two, segments; and in either case they are very distinctly but sparingly, toothed. In the perichætal leaves this denticulation is still more obvious. The stipules also, instead of being variously lacinated, are regularly bifid, with the segments only slightly toothed. The characters, which distinguish *J. bidentata* from *J. heterophylla*, will be enlarged upon in the following description, so nearly, however, do the two plants approach, that, by some writers on the subject, they have been looked upon as mere varieties of each other and, indeed, such was formerly my own opinion.

The agreeable smell that has frequently been noticed as diffused by this plant appears to be by no means confined to it alone. Dr. Schrader under his *J. grasscolens* (which appears closely allied to our *J. trichomanes*) remarks "Odor plantæ recentis gravis. Scandit Cerefolio lachd. dimissibile." In *J. bidentata* I have observed the scent to be more powerful after the plant had been dried for a few days, and then recovered by an application of moisture.

On this Jungermannia I have more than once had the opportunity of observing that phylls are formed before the calyx, and, by examining the terminal clusters of leaves*, they may not

* Such leaves I have generally found to be divided into two, three, or even four segments, at the extremity, and these varying much in size and direction. Is it not possible that these may unite and form the calyx? An incision, more or less deep, is generally seen in one or other of the angles, as if the leaves (suffering such a change to take place) had not been united quite to their apices. The same appearance, also, may be remarked in *J. heterophylla* (vol. 2. 31 f. 11.), in *J. septentrionalis*, and *J. spinulosum*.

unfrequently be found completely destitute of this part. In *J. complanata*, also, the calyx is to be seen in an extremely diminutive state, at the same time when the periantha are fully formed; and I have reason to believe that this mode of growth, far from being confined to these two plants, is not unfrequent in the genus.

Schmidt's *J. bidentata* I have elsewhere mentioned as belonging to *J. ventricosa*.

Schreber is the first person who discovered the stipules on this species. They are sufficiently large to be distinguished with a small power of the microscope, and are always present, throughout the whole length of the plant.

REFERENCES TO THE PLATE.

nos.			
1.	<i>J. bidentata</i> (female plant), natural size.		
2.	Var. β , natural size.		
3.	Female plant, magnified	+ ..	6
4.	Portion of a surculus and leaves	+ ..	4
5.	Leaf, seen from its under surface, with a stipule	- "	3
6.	Stipule		2
7.	Perichætiæ leaves	+	4
8.	Calyx	+	4
9.	Calyptra	..	3
10.	Stems and spiral filaments		1
11.	Var. β , <i>obtusata</i> , magnified	-	6
12.	Stipule of Var. β .		2
13, 14.	Anthers*	..	1

* These anthers, it ought to be remarked, were taken out of the terminal buds of leaves of Var. β , probably before the formation of the perigynial leaves, which have been described above.



Jungermannia heterophylla

JUNGERMANNIA HETEROPHYLLA.

(TAB. XXXI.)

JUNGERMANNIA, auricula procumbente, ramoso foliis rotundato-ovatis, decurrentibus, apice mucida acutè, plerumque obtusè emarginatis, integrisve stipulis bi-tri-fidis, hic illic applanatis fructu terminali, calycibus ovatis, obtusè triangularibus; ore laevigato.

Jungermannia heterophylla. SCHRADE in *Journal für die Botanik*. v. p. 66.

Jungermannia bidentata. *ß. minor*, LAMOUR, *Herb.* p. 249. (excl. syn. HALLEN. 1865.) WARR, *Plant. Crypt.* p. 116 (excl. syn. MICHELL. t. 5. f. 13. et HALL. *Herb.* 1865.) WARR, *Spic. Fl. Gart.* p. 134. WERR. III. p. 853?

Jungermannia lincupidata. ENGELM. *Bot. t.* 281. (excl. syn.)

Lichenastrum planius obtusiusculus bifidus, MURR. *Dill. Musc.* p. 488. t. 70. f. 19. (excl. syn. MICHELL.)

HAB. First detected in this country, by the Rev. R. B. Francis, growing on decaying stumps of trees in Edgesfield Wood, also at the foot of alders in Hanworth Meadows, Norfolk, and in an alder copse, at East Sheal, Lincolnshire. I have since found it not rare in similar situations in various parts of Suffolk, as well as very abundantly upon rocks at Rushbridge Wells.—Mr. Lyell has also discovered it in the New Forest, Hampshire, where he has observed the male fructification to be produced in November. The female is found in the early spring months.

PLANT growing in rather small and loosely-entangled patches, frequently among moss.

The *Roots* in the present, as well as in the species last described, originate here and there from nearly the whole length of the under side of the plant, but mostly in small tufts immediately below the stipules (f. 4).

Stipuli from half to three quarters of an inch in length, procumbent, flexuose, with their apices, as well as those of the simple shoots and ramuli, erect, of a pale green color.

Leaves (f. f. 2. 3. 4. 5. 6) scarcely ever exceeding half a line in length, frequently less, especially at the base, and towards the extremity of the plant, more or less closely

placed, in different individuals, plane, or very slightly concave, bifurcous, horizontal, of an ovate figure approaching to round, at the base semicircular and decurrent, at the extremity varying in a very remarkable manner, whence the species has most justly been named, by the acute Schrader: *heterophylla*. Scarcely two individuals are found to correspond exactly. Throughout all the leaves, in the figure of this part, though, in general (f 2) it may be considered as being in them placed nearest to the base of the stem, acutely divided far about one fifth of its length from the apex into two acute segments, which are divergent in a slight degree while those of the middle of the surridge have it obtusely emarginate with the extremities also obtuse, sometimes truncate, without any notch; and, as the leaves approach the extremity of the plant, they are quite entire rounded off, and frequently more ovate than the rest. In other specimens, however, the leaves are sometimes all emarginate (f 4), or here and there, and without any kind of regularity, intermixed with some that are entire, whilst others are acutely cleft; and I have lately received from Mr. Lyell specimens, among which were individuals having their leaves so nearly entire throughout that, had it not been for the calyx and stamens, they might easily have been mistaken for a distinct species. In all, the color is a pale green varying, from situation, to a deeper hue: the *cellules* large and ovate.

Perigonal leaves as those of *J. dentata*, closely imbricated in two rows, at the base ventricose, the extremity somewhat revolute emarginate or entire: they are found as well upon the same plant with the female fructification, as upon different individuals, and often immediately below the *perichloral leaves* (f f 9, 10, 11).

These are still more remarkable for their difference of form than the cauline ones. In some they are altogether entire; in others both bifid and entire; whilst some again are found which have the third pair from the calyx very obtusely emarginate (f. 1) with blunt segments, the second pair deeply, but obtusely, emarginate, with acute points, and those slightly dentated (f 10), and the first, or calycine pair varying with two or three acute, ovate segments, of different sizes, distantly and unequally toothed (f. 9 & 8). These last are generally erect and appressed to the lower part of the calyx.

Stipules (f f 7 & 8) one in each pair of leaves, appressed to the lower side of the stem, oblong, bifid or trifid, with the segments more or less diverging, and here and there toothed or lacinated.

Male Fructification. *Strobili* situated in small clusters, exactly resembling those of *J. dentata*.

Female Fructification terminal upon the extremity of the aerial and short branches, as well as upon some so short, that, without a careful examination, they might be supposed to be lateral.

Calyx (f 12) scarcely three quarters of a line long, ovate, with the sides very obtusely triangular, or even round (supposing a transverse section), the mouth expanded, like some way down on one side, and much lacinated.

Calypter ovate, thin, and delicate. I have gathered plants which had (probably in consequence of weakness in the capsule or footstalk) carried up the calypter entire, with the fruit, as in the annexed, and, though not in so perfect a state, as *Audrea* (f. 13)

BRITISH JUNGERMANNIÆ.

(2) *Heterophylla*.

Capula ovate, dark brown, dividing into four equal ovato-lanceolate valves, and discharging the numerous

Seeds and *spirae filamentosæ*, which are of a fulvous color

J. heterophylla was well known to Dillenius, who justly says of it in his description, "Pinnule breviores et obtusius minisque profundè ac præcinctis (*J. bidentata*) et sequentis (*J. bicauphilæ*) speciei, habet autem." Other authors, however, have considered it as only a variety of *J. bidentata*. It differs from that plant in the following particulars. Its mode of growth, as far as I have been able to discover, is always in small and straggling patches, even when growing unmixt with mosses. Its fructification is far more abundant. Its size is much less. The leaves, though so variable in figure, are never that I am aware of, acutely divided into two equal and strait segments. The stipules are less lacinated. The calyx shorter in proportion to its width, somewhat less angular, and the mouth more open. Some of the leaves undoubtedly bear a considerable affinity with those of *J. bidentata* β, and it is probable that Mr. Francis is correct in his opinion, in supposing this variety to belong to the present plant. I have, nevertheless, been tempted to consider it rather as a varying appearance of the former species, from the circumstances of the plant being larger even than the α of *J. bidentata*, of the leaves being always amarginate, and of the stipules being so much lacinated.

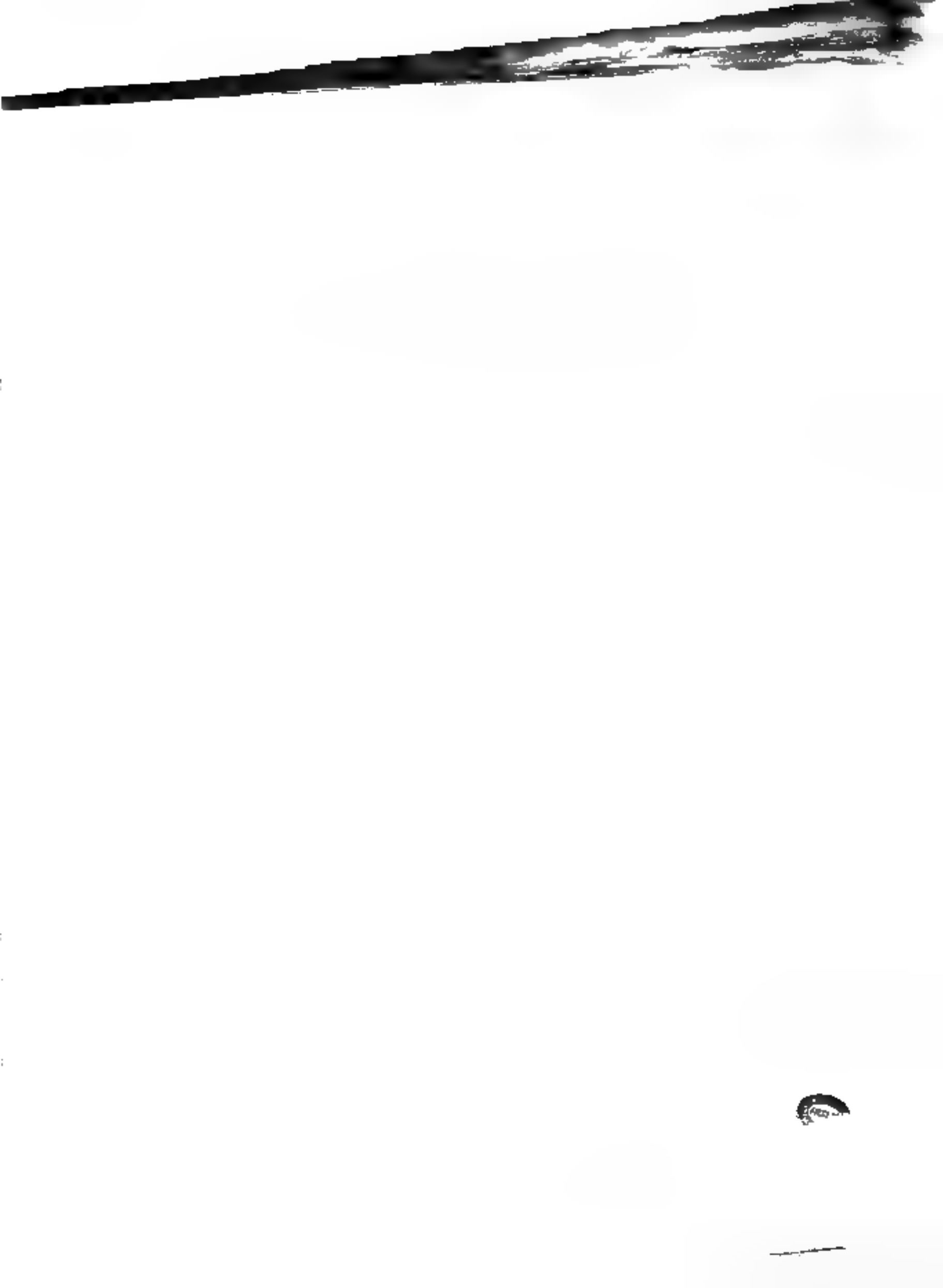
An examination of authentic specimens of *J. heterophylla*, which Dr. Schrader communicated to Mr. Turner, leaves me no doubt as to the identity of our British plant; and that author describes the same stations for it in Germany as those in which it is found with us; "ad truncos arborum, imprimis emortuorum ubique fere, haud infrequens occurrit." The Italian synonyma quoted by Less and Weiss, I have more reason to think belongs to *J. ventricosa* (under which species I have placed it) than to the present, and I am inclined to the same opinion with regard to the Michelian synonyma of the latter writer.

REFERENCES

REFERENCES TO THE PLATE

FIG.

1. <i>J. heterophylla</i> (female plant) natural size.	
2. The same, magnified	6
3. Portion of the saccus and leaves, magnified	5
4. Portion of a saccus and leaves	8
5. Portion of a saccus and leaves, seen from behind	4
6. Leaf	3
7, 8. Stipules	2
9. Inner perichetial leaves	3
10. Intermediate perichetial leaves	3
11. Exterior perichetial leaves	3
12. Calyx	3
13. Capsule with its calyptra	3
14. Seeds and spiral filaments	1





Jungermannia cordifolia

JUNGERMANNIA CORDIFOLIA.

(TAB. XXXII.)

Jungermannia, caule erecto, flexuoso, dichotomo. Folia erectis, concavis, cordatis, circumvolutis: fructu terminali axillarique; calycibus oblongo-ovatis, subplicatis; ore minuto, denticulato.

HAB. Highland Mountains of Scotland, in many moist situations.—Mr. Hume finds it in Ireland; and Mr. Lyeil, at Iain and Catlaw, in Angus-shire. (Calycos were discovered, with swollen germen, on the thirty-first of August, by Mr. Lyeil.)

PLANT growing in rather dense tufts, conspicuous from their black appearance, one or two inches in diameter,

Root a very few minutes, simple fibres, proceeding almost wholly from the base of the plant. *Stems* varying from one to two and even three inches in height, flexible, waved, cellular, always erect and filiform, sometimes simple, but more frequently branched in an irregularly dichotomous manner; with branches of uncertain length, simple, or at most producing one or two young lateral shoots; their color a dirty green or brown.

Leaves bifarious, rather distantly placed, from half a line to a line or more in length, the lower and the terminal ones generally the smallest—all of them erect, or erecto-patent, loosely imbricated, cordiform, concave, with their margins embracing the stem so as entirely to conceal it. Their texture is extremely thin, membranous and subdiaphanous, the reticles of a roundish figure, their color a very dark olive or almost black green, varying, in some situations, to a deep purple towards the extremity of the plant. The leaves on the innovations exactly resemble the rest in figure, but are much smaller and have their margins more involute and more closely embracing the stem, the apices, however, are a little patent, so that these young shoots at first sight have somewhat the appearance of a *Sertularia*. In drying, the leaves become much crisped, and do not recover in water without much difficulty.

The *Perigonial leaves*, which extend from the apex of a stem to nearly half way down its length, *wholly differ* from the rest, except in having their base more concave.

The *Perichætal leaves* are also, in every respect, like the cauline ones.

MALE FRUCTIFICATION. *Anthæ* situated in the axille of the perigonial leaves, large in proportion to the size of the plant, exactly spherical, reticulated, placed upon a short, pedicel, transversely striated footstalk. On pressing one of these with an instrument while under the microscope, an extremely minute pollen, or granulated substance, was discharged, each particle of which was roundish angular, and semitransparent.

FEMALE FRUCTIFICATION both terminal and arising from the axille of the branches.

Calyx oblongo-ovate, much lengthened out at the base, the upper part slightly plicate, the mouth small and very indistinctly toothed.

Germea ovate, dark green.

Barrea pusilla eight or ten in number, linear, longitudinally striated.

The present is one of the most distinct of the British *Jungermanniæ* with which I am acquainted, nor can I mention any to which it bears the smallest affinity, either in the form of its leaves, or in the singular manner in which they embrace each other with their involute margins. The color too is very peculiar, being extremely dark, so that, when seen in tufts, it appears almost black. By immersion in water for a few hours, a deep brownish tinge is imparted to the liquid.

In the form of the calyx this species approaches *J. suævia*, but the calyx here is shorter in proportion to its diameter, and less plicate, the leaves of the two plants are very unlike, and so strikingly are those of the present species heart-shaped (when they are expanded, as at f 5), and so much do they in their general direction resemble those of *Hypnum cordifolium*, that I have thought that the same specific name would also be applicable to the *Jungermannia* as to the *Hypnum*.

Mr. Dickson was probably the first person who gathered this plant, since I find it among a number of unnamed species that he has been so good as to send me, which were collected many years ago in the Scotch mountains. Mr. Woods has since gathered it in Ireland, and Mr. Lyall and myself in Scotland.

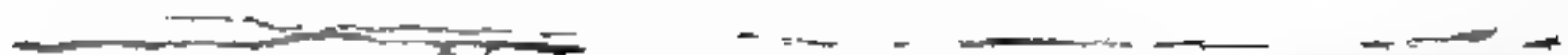
BRITISH JUNGERMANNIÆ.

(*J. cordifolia*.)

REFERENCES TO THE PLATE.

FIG.

1	A small cluster of barren plants, natural size.	
2	Plants with male fructification, and the female in a young state, natural size.	
3	Plant bearing anthers and calyces, magnified	4
4	Male plant	6
5	Perigonial leaves	4
6	A single perigonial leaf expanded, to show the form of the leaf and the auxiliary anther	3
7	Full-grown anther	2
8	Young anther	2
9	Full-grown anther broken, to exhibit the pollen	2
10	Pollen	1
11	Calyx	5
12	The same, longitudinally dissected	4
13	Pistille	3





Jungermannia nana, Lophocarpus

JUNGERMANNIA SPHAGNI.

(TAB. XXXIII.)

JUNGERMANNIA, caule procumbente, simplicistriculo: (elongationibus gemmiferis subsummo stipulatis): foliis orbicularibus. Fructu in ramis propriis terminali; calycibus oblongis, utrinque attenuatis, ore contracto, denticulato.

Jungermannia Sphagni. Dicks. Crypt. Flor. 1. p. 4. t. 1. f. 10. HORT. Germ. ii. p. 83. ROT. Germ. iii. p. 375. LAMARCK. Encycl. iii. p. 330. WITT. iii. p. 654. LICH. Sp. Nat. ed. Germ. ii. p. 1348. Engl. Bot. 1. 2470.

HAB. Marshy places, particularly among *Sphagnum latifolium* and *capillifolium*.—Near Croydon. Mr. Dickson.—Holt Bogs. Rev. R. B. Francis.—Belton, near Yarmouth. Mr. Turner.—Near Belfast, Ireland. Mr. Templeton.—Bogs, on mountains, near Bantry. Mr. Hutchins.—New Forest, Hampshire, most abundant; (bearing gemmæ in October and November, and young fructification towards the end of the latter month.) Mr. Lye.

This remarkable PLANT grows either in loosely entangled patches of some inches in diameter, or more straggling, when attached to the stems of *Sphagnum*.

Roots of two kinds (f. 4) small radicles, such as are common to almost all the species of the genus, consisting of minute, whitish, simple, and pellucid fibres, proceed tolerably abundantly from nearly the whole length of the plant but, among these, at uncertain distances, descend radicles of a much larger size, and from two to three lines long, of a whitish color, rather opaque, though I cannot perceive that they have any of the cellular texture; sometimes simple, but more frequently divided by three or four small lateral and descending shoots.

Stems from two to four inches in length, procumbent upon the substance that affords them nourishment, and consequently erect with regard to the horizon, when they are attached to the upright plants of *Sphagnum* (f. f. 9. 3), filiform, flaccid, simple, or only producing here and there short innovations, which resemble the main stems, and are of a yellowish-green color, while that of the principal stems is pale yellow-brown.

The *Leaves* (f 4), which are in general about half a line in length, are bifarious, alternate, for the most part so closely placed that their margins are slightly imbricated over each other, though, sometimes, as may be seen at f 3, they are more distant and have often a vacant space between each pair. They are patent or erect, rarely horizontal, throughout of an orbicular figure, on the upper side concave, below convex. The cells are at the extremities of the leaf nearly quadrate and regular in figure, giving the edge a slightly margined appearance, in other parts they are roundish, and so minute as to be seen only with a tolerably high magnifier. The color varies from a rich yellow-brown to a pale yellow-green, having the tip of the leaves and especially of those that are nearest the extremity of the stem, not infrequently tipped with purple.

The *Perigynæ* leaves I have not yet seen.

The *Perichætæ* leaves are confined to the short proper footstalk of the fructification, and are at its base roundish and entire, after which they become emarginate, and, the nearer they approach the calyx, the more frequently are they divided and incised; the uppermost are the largest, oblongo-ovate, and cut into five or six lacinated or toothed segments, their substance is more loosely cellular than that of the other leaves, their color is much paler and more yellow-green.

Stipules are discoverable on this plant, but only on the shoots which produce the gemmæ which are also furnished with leaves of a much smaller size than those of the main stem, though similar to them in shape. Each stipule is oblong or ligulate, obtuse, entire, except in those that approach the extremity of the shoot, where they are emarginate.

Male Fructification unknown.

FEMALE FRUCTIFICATION situated upon short proper footstalks, which are either lateral, originating from the under side of the plant, or terminal.

The *Calyx* is about a line and a half long, of an oblong figure, but attenuated at each extremity, extremely delicate, whitish, semipellucid (so as to show the young capsule within), and slightly plicate, the mouth contracted and a little toothed. The fructification I have not seen in a more advanced stage.

Gemmæ are found in great abundance and perfection in October and November, always upon elongations of the extremity of the plant, which are readily distinguishable from the rest of the stem by their smaller size, by their gradually tapering towards the apex, by the diminutive leaves, and still more easily by the stipules which are confined to them; at least Mr Lyell and myself have in vain searched for them throughout the rest of the plant. Both the terminal leaves and stipules are a little emarginate, and bear a few scattered gemmæ, which are supported, in the form of little globules, sometimes single and sometimes two or three together, on the extremity of the shoot. Each particle is very minute, roundish, beset with a number of angles, pellucid, and of a pale yellow-green color.

BRITISH JUNGERMANNIÆ

(J. *Sphagni*.)

It is to Charles Lyell, Esq., of Bartley Lodge, that the botanical world is indebted for most of the above interesting particulars relative to the fructification and gemmæ of *Jungermannia Sphagni*. The industry and researches of this gentleman in the tribe of plants which are the subject of this publication, have been unwearied, and his success (as these pages will amply testify) has been commensurate with his zeal. Till very lately Mr. Dickson's original specimen from which his figure and description were taken, was the only one that had been found in fructification, and I exceedingly regret that it has not been in my power to add to the accompanying plate, figures of the specimens in that state which Mr. Lyell has so liberally communicated to me. They will however, appear in a supplementary number, for which they are reserved.

It is almost needless to point out the discriminating marks of a species so distinct as the present, and I shall content myself with observing, that the large radicles, and the peculiar form of the calyx together with its proper footstalk, are, I believe, confined to this species. The leaves, also, though they bear no small resemblance, in general outline, to those of a new *Jungermannia*, which I propose calling *J. Taylori*, as well as to some of the leaves of *J. ozeana*, and to those of *J. scularis*, may always be known from those of other *Jungermanniæ*, by the firmness of their texture, and by the remarkable smallness of the cellules, combined with their general shape.

Although *Jungermannia Sphagni*, in a barren state, has been found in various parts of England and Ireland, yet the continental botanists seem to be scarcely acquainted with it. Hoffmann, indeed, Roth and Lamarch, have noticed it in their respective works, but they have copied, almost verbatim, the description of our English cryptogamist, Mr. Dickson. It is certainly found in Sweden, whence I have received specimens from Dr. Swartz.

REFERENCES TO THE PLATE.

FIG.

- | | | |
|-------|---|---|
| 1, 1. | <i>J. Sphagni</i> natural size, and magnified | 6 |
| 2, 2. | The same, natural size. | |
| 3. | <i>J. Sphagni</i> , magnified | 8 |
| 4. | A leaf with a portion of the stem and roots | 3 |





Juniperus communis

JUNGERMANNIA ANOMALA.

(TAB. XXXIV.)

JUNGERMANNIA, caule procumbente, simplicio foliis orbicularibus, basi rotundato-ovatis, limbo ovato-acuminatis stipulis lute subulatis.

HAB. Holt Lowes. Bogs on the south side of Edgesfield Hill on the road to Holt, and in Holt Wood growing both upon peat-earth and among *Sphagnum*. *Rev. R. B. Francis*.—Westleton Bogs, near Halesworth, Suffolk, and boggy places in various parts of the Highlands of Scotland.—Summit of Devils Mountain, in the county of Antrim: and in Annahilt Bog in the county of Down. *Mr. Temptleson*.—Near Bantry, growing among *J. eximio*. *Miss Haichlan*.—In bogs at Kinnorty, Kierie-muir, and in the New Forest, Hants. *Mr. Lyell*.—At the last-mentioned place *Mr. Lyell* finds Anthers in October. The Gemmæ are in great perfection in November.)

PLANT growing in loosely entangled and scattered patches, either attached to the earth, or, more frequently, to the stems and leaves of *Sphagnum* among which it is generally found.

Root consisting of numerous, small, whitish, pellucid, simple fibres which descend from nearly the whole length of the under side of the plant.

Stems from one to two or even four inches in length, and about a quarter of a line or more in diameter, procumbent flexuose, either simple or producing only one or two short lateral innovations from beneath the leaves. Its texture is rather firm. Its color varies from a yellow-green to a dark brown, and in some situations almost to a black; the innovations are of a more delicate texture, and more distinctly cellular, and partake more of the color of the leaves.

Leaves from half to three-quarters of a line long, more or less distantly placed in a bifarious manner, varying in their direction from horizontal to patent and (as is frequently the case) to erect, nor less variable in their shape, which is either orbicular, orbicular approaching to ovate, or altogether ovate, with acute apices. The orbicular leaves (f. 11) are in almost every instance concave on the upper surface and convex beneath: those of the second description (f. 12) are likewise slightly concave, whilst those that are ovate and acute are either plane (f. 14) or concave, or have their sides incurved (f. 13).

Orbicular leaves are sometimes found throughout the whole length of an individual, but it more frequently happens that those at the base of the stem alone are of this shape, and that thence they become more ovate and acute as they approach the extremity at the extreme apex, three or four leaves (before their expansion) often embrace each other so closely as to form an oblong acute mass, which may, without due examination, be really mistaken for a calyx. It is to be observed that the upper leaves in gemmiferous plants are often jagged at the point, or cut into two, three, or more unequal teeth. The *cellules* are throughout remarkably large in proportion to the size of the leaf, and are conspicuous to the naked eye, when the plant is in a dry state, by a punctated appearance, they are of a roundish form, except at the border, where they approach more nearly to quadrate (but scarcely in so regular a manner as to cause a margined appearance upon the edge), and in the ovate leaves the *cellules* are of a more oblong figure. The color is generally a rich but rather pale yellow-brown, the apices of the leaves often slightly tinged with purple.

Stipules small, subulate one to each pair of leaves.

The *Perigonial Leaves* differ in no other respect from the rest, than in having a ventricose base near the insertion upon the stem, where the

MALE FRUCTIFICATION is situated. *Anders* small, spherical, reticulated. *Footstalk, or Filament*, white, striated transversely.

FEMALE FRUCTIFICATION at present unknown.

ORI. *Gemmae* are found on this species throughout the greatest part of the year, but most plentifully in the autumn. They form two or three rather compact spherical clusters, of a pale yellow-green color, at the apex of the terminal leaves, and some below them also bear them at their points, either in small globules or loosely scattered. Each particle is semipeltoid, and roundish, but angular. It may be well to remark that the leaves, which support them, seem to be injured, and have their apices as it were corroded and jagged, after the dispersion of the *Gemmae*.

J. anomala was first discovered by the Rev R.D. Francis, who has for many years remarked it in his immediate neighborhood. I have also received it from other parts of England, as well as from Scotland and Ireland, but always without any of its parts of fructification, except the *Anders*, which have once been found by Mr Lyeil. Dr Swartz, too, has sent it to me from Sweden, gathered along with *J. Spägn.*

The most striking features about this plant are the uncertain form of the leaves, varying, even on the same individual, from orbicular to ovate-acuminate, and the large size of the *cellules* in proportion to that of the leaf. In the former particular it has no affinity with any species with which I am acquainted, and in the latter it bears a resemblance only to *J. Taylori*, which also has *stipules* agreeing very nearly in figure with those of the present species. In both they are

BRITISH JUNGERMANNIÆ.

(*J. anomala*.)

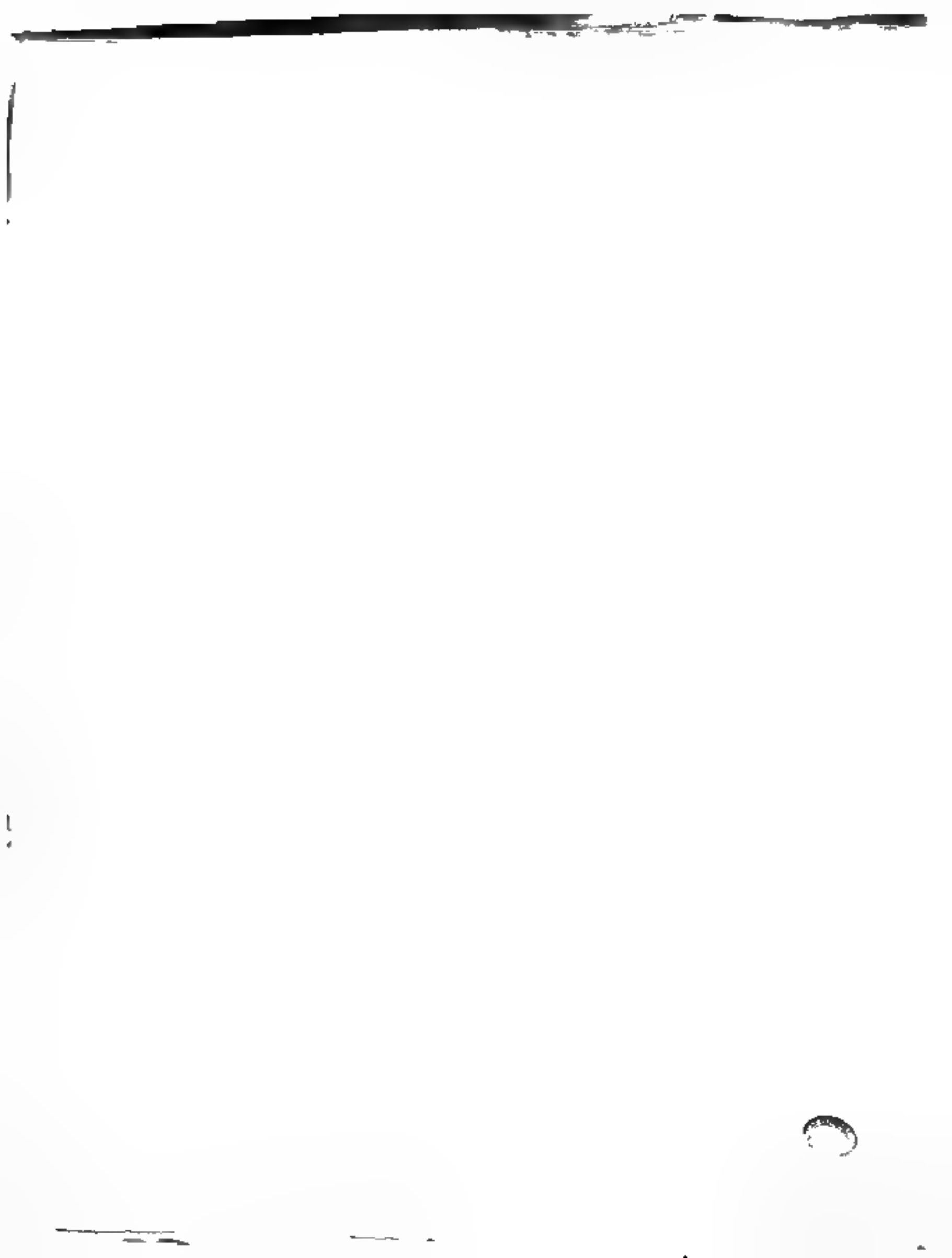
not discoverable without considerable difficulty, and in *J. anomala* they altogether escaped my notice till within these few days. They are most readily seen towards the extremity of the plant, all the rest of the under side of the stem being so much covered by the roots though they here exist also.

The principal difference, therefore, between *J. anomala* and *J. Taylori*, consists in the presence of the ovate and acute leaves of the former, which are wholly wanting in the latter other marks, though much less to be depended upon, may be found in the densely-crowded patches in which I have always seen *J. Taylori* grow, so that the individuals are forced into a nearly erect position, and in its color, which, in all the specimens that have fallen under my observation, has been far deeper, and generally with a purple tinge throughout. The fructification of this plant, which alone could remove all doubt respecting the specific difference of these individuals, has, unfortunately, not yet been discovered.

REFERENCES TO THE PLATE.

310.

1. *J. anomala*, gemmiferous plant, natural size.
2. The same, magnified 5
3. Beryn plant, natural size.
4. Portion of the same, magnified 5
5. *J. anomala*, with orbicular leaves throughout, and innovations, natural size.
6. The same, magnified 6
- 7 and 8. The same, with the leaves erect, natural size and magnified 6
9. A more common appearance of the plant, natural size.
10. The same, magnified 6
- 11, 12, 13, and 14. Various leaves, magnified 5





Sargassum laevigatum

JUNGERMANNIA LÆVIGATA.

(TAB. XXXV.)

JUNGERMANNIA, caeruleo procumbente, vagè bipinnatim ramosa foliis bifidis, inaequaliter bilobis, spinuloso-dentatis, lobis superioribus majoribus, rotundato-ovatis; inferioribus ligulatis, planis, appressis: stipulis oblongo-quadratis, spinuloso-dentatis.

Jungermannia levigata. SCHREBER, *Syst. Semml.* ii. p. 6. EORT, *Germa.* iii. p. 608.
LAMARCK, *Fl. Fr. ed. 2. t. 11. p. 492?*

HAB. Upon the earth in a wood on the north side of the banks of Lochness.—Mr. Brodie has given me specimens found at or near the same place.—Communicated to me likewise by Mr J T Mackay, whose brother, the late Mr Mackay of Edinburgh, gathered it in Scotland.—Near Bantry, in a mountainous situation. Mrs Hutchins.—Upon a rock, on the Castle-Hill, Kinross, Kerris-muir, Mr. Lyell.

PLANT growing in loose patches, which lie over each other in an irregularly imbricated manner. Root consisting of a few, very small, simple fibres, descending, at distant intervals, from the lower side of the plant.

Stems procumbent, flexuose, from two to three and even four inches long, beset with many dichotomous, nearly horizontal, scattered ramuli, which vary from half an inch to two inches in length, long and short being intermixed without order; the smaller ones simple, the larger again pinnated by a few short and simple shoots, equally irregular in point of size, number, and position: the whole of the branches are angularly attenuated at their origin, but then linear, and blunt at their points: their texture is firm: their color a dirty brown.

Leaves (f. f. 3. 4) in general about half or three-quarters of a line long, those at the base and extremity of the stems and branches smallest, it not very unfrequently happens that the even outline of the shoots, which is in general remarkable, is here and there interrupted

by smaller leaves, or such as are decayed, as may be seen in f. 1 and 2. They are every where bilobous, closely imbricated over the upper side of the stem, and placed alternately, with great regularity and exactness, divided into two very unequal conuplicate lobes, of which the upper one is much the largest. convex on the upper surface. more or less smooth, and even glossy, of an ovate figure approaching to round, with its margin sometimes entire, but more frequently spinuloso-dentate, the teeth being of very unequal sizes, placed at distant but uncertain intervals, and generally incurved, the inferior division or lobe is scarcely one-third so large as the superior, to the under side of which it is closely appressed in a direction oblique with regard to the stem, its form is oblong or ligulate, its margins every where dentato-spinulose, with the teeth occasionally recurved. The reticulae are very small, roundish; the color a dark oliv-green, sometimes inclining to a yellow-brown.

There is one *Stipule* (f. 5) to each pair of leaves, oblongo-quadrata, and, equally with the lower lobes of the leaf, which it exactly resembles in size and shape, spinuloso-dentate at the margin, having its teeth in like manner now and then recurved.

Dr. Schrader appears to be the first botanist who detected this species, and published it as distinct from *J. platyphylla*, to which I must confess it bears so close an affinity (and especially to the var. *Thapsi*) in every thing, but the spinuloso-dentate margins of the lesser lobes of the leaves and of the stipules, that I cannot help offering it as my opinion that future discoveries may prove it to be a variety, though a very strikingly marked one. At the same time I must observe that, in all the specimens I have examined of *J. platyphylla*, I have never found the stipules and smaller lobes of the leaves to be otherwise than quite entire at the margins. The difference in size and in the smoothness of surface, mentioned by Schrader, will not hold good, the same being found often to exist in an equal degree in *J. platyphylla*.

Dr. Roth has done no more than copy the description of Schrader, and add synonyms from Micheli and Dillenius, which appear to me rather to belong to the *J. Thapsi* of Dickson, so that no new light is thrown on the matter in his work. Lamiach also describes a plant under the name, *J. levigata*, in his *Flore Française*, and cites Schrader's as a synonym, but his words are at variance with such a reference, so that, though I have thought it best to quote him above, I have done it with doubt, and I fear it must be admitted from his description, that his *J. levigata* is, in reality, a totally different species, 'Les feuilles,' to use his words, "sont nombreuses, serrées, embriquées, larges, courtes, très obtuses, presque tronquées, surmontées d'une petite pointe acérée, entières sur leurs bords, dépourvues de nervures et de stipules, disposées sur deux rangs d'une manière peu prononcée."

The fructification, which I have never yet seen, was also unknown to Schrader and Roth.

BRITISH JUNGERMANNIÆ.

(*J. levigata*.)

REFERENCES TO THE PLATE.

FIG.

1. *J. levigata*, natural size.
2. The same, magnified 6
3. Portion of the stem, with the leaves and stipules, seen from the under side . 4
4. Leaf 3
5. Stipule 2



Jungermannia tomentella

JUNGERMANNIA TOMENTELLA.

(TAB. XXXVI.)

JUNGERMANNIA, caecula erectiuscula, bipinnato foliis bifaria, inæqualiter bilobis, lobis inferioribus minutis; superioribus bipartitis; utriusque apice margineque capillariter multifidis, stipulis subquadratis, laciniatis fructu axillari; calycibus submagis, cylindricis, hirsutis, ore aperto.

Jungermannia tomentella, ERM. *Balt. Band.* ii. p. 150. *Hort. Germ.* ii. p. 63. ROT. *Germ.* ii. p. 401. DICHA. *Plant. Crypt. Fasc.* ii. p. 14. LAMARCK, *Pl. Fr. ed. 2. v. ii.* p. 436. LAM. *Syst. Nat. ed. Gmel.* iii. p. 1351. MICHAUX, *H. Bor. Am.* ii. p. 279. LAMARCK, *Fl. Gall.* p. 25. *Engl. Bot.* t. 2242.

Jungermannia ciliaris, WEIS, *Plant. Crypt.* p. 189. WANKS, *Spec. Fl. Gall.* p. 160. HUB. *Angl.* p. 515. LAMARCK, *Engl. Bot.* iii. p. 284. WITM. p. 361.

Musci palustris, Abiesis folio, crispatus TORRE, *H. Pl. Par.* p. 506.

Musci filicinus perlegantius crispatus. PAT. *Nasc.* n. 438. (Sda Dill.)

Musci Lichenoides, quasi filicis folio distichonibus ciliis referens. RUPPI *Fl. Ice.* p. 405.

Lichenastrum filicinum crispum. RAB. *Syn.* p. 111.

Musci palustris, Abiesis folio. VAILLANT, *Bot. Par.* p. 141. t. 28. f. 11.

Lichenastrum filicinum, pulchrum, ciliatum. DILL. *Musc.* i. 73. f. 25.

Jungermannia caule planata, foliis crispis capillariter multifidis. HALL *Held.* iii. p. 63. n. 1861.

HAB. Plentiful in moist places in various parts of the south, west, and north of England, as well as in Scotland and Ireland.—So abundant is it at Allen's Ford, near Durham, that Mr. Thornhill informs me he could, in a very short space of time, have loaded a cart with it.—(Mr. Lyell finds it with anthers in October, and Dillenius observes that the capsules are produced in the month of March.)

PLANT growing in densely crowded patches, often covering a space of ground of several feet in diameter, and rendered very conspicuous at a distance, from its extremely pale-green color.

Root scarcely any, except a few pellucid, short, and simple fibres, which may now and then be seen towards the base of the plant.

Stems * from two to three and even four $\frac{1}{2}$ inches in length, and about the half of a line in breadth, nearly erect, branched, the primary division, which takes place near the base, is generally dichotomous, the rest of the plant is pinnated with pinnæ, alternate, and somewhat distant branches, from three to five lines in length, which are, in like manner, often again beset with still shorter pinnules. The extreme ones are very slender and zigzag, somewhat resembling the rachis of an ear of barley. The texture is every where firm and compact, closely cellular, particularly in the lower part, where it is of a brownish hue; the rest is of a yellow-green color.

Leaves (f 4) about half a line long, but what is remarkable, scarcely larger on the main part of the stem than on the secondary branches, thus appearing as if these stems had outgrown the leaves, which are in that part also distinctly placed. In the rest of the plant they are more or less closely imbricated over the upper part of the strobili, and at the extremity they form a thick head or tuft. Each is petioled or horizontal with regard to the stem, divided into two unequal lobes, of which the lower one is the smallest, plane, concuplicate with the upper one, and appressed to its under surface; the superior lobe is plane, or very slightly convex, acutely cleft nearly down to the base into two linear or lanceolate segments, whose apices and margins, as well as those of the lower lobe (though not in so great a degree), are divided and subdivided into many capillary segments of various lengths, and as variously curved, which give a tomentose appearance to the whole plant, and render the true figure of the leaf very difficult to be observed. The cellular of the leaf are oblong, rather large in proportion to its size, in the narrowest part of the branched segments they occupy the whole diameter, thus having a jointed appearance, resembling that of mossy *Conferva*, and the entire leaves of *Jungermannia trichophylla* and *sericea* ^{see f.} like them too, the joints in drying are here and there frequently contracted. Their color is almost always a pale green, resembling that of *J. sericea*, though sometimes, as Mr. Lyell has observed, varying to a deeper hue, which happens, probably, whenever the plant grows in less exposed situations than usual.

In the *Peripoma* leaves I can distinguish no difference whatever from the rest.

Peristomial leaves (f 7) wholly wanting unless the peristome that arises from the exterior surface of the calyx may be looked upon as such. This is composed of minute, capillary, and slightly-branched processes, which, under a high power of the microscope, are seen to resemble the narrowest of the lacinie upon the leaves, and like them have the jointed appearance of a *Conferva*.

Stipule one in every pair of leaves, subquadrato; generally about the width of the stem, cleft at the apex into a number of very narrow, and, frequently, branched segments.

Male Fructification *Anthere* situated on the upper surface of the stem, in the axilla of the leaves, spherical, reticulated, of a greenish hue, and placed at the extremity of a short white filament.

* When the plant is dry, the dimidly placed stipules, on the lower part of the stem, become visible, and give it the appearance of being pinnate.

† Muller describes them as existing to the length of half a line, in the neighbourhood of *Bursa*, in Switzerland.

BRITISH JUNGERMANNIÆ.

(*J. tomentella*.)

FEMALE FRUITIFICATION is the calyx of the primary divisions of the stem.

Calyx (f. f. 5. 6.) nearly a line and a half long, oblong, cylindrical, a little increasing in size towards the mouth which is expanded and entire. Its whole substance firm and subcoriaceous, indeed, as much as in that of the stem, with the nature of which it seems to agree. It is of a yellowish-brown color, and is on its exterior surface, beset with those capillary branched processes, which I have described above as (the perichætal) leaves; these form at the mouth a minute kind of fringe.

Calyx-tube (see f. 6.). At least, in the only specimen of the calyx that I had an opportunity of dissecting, I was not able to find any. It may however, have been an injured one; yet I am acquainted with two foreign species of this genus that have, like the present, the perichætal leaves arising from the calyx, in which I have universally found that the calyx-tube was wanting; a circumstance that tends to confirm my belief that the gametophyte is here likewise destitute of that part.

Palmaria one or even two inches in length, striated, and often slightly twisted, fixed into the receptacle by means of a small conical bulb, and terminated by the

Capsule, of an ovate shape, and deep purplish brown color; dividing at maturity into four equal valves.

The seeds and spiral filaments (f. 8.), which I have only seen from an imperfect capsule, are of a fuscous color; the former spherical, the latter compound of a double helix.

J. tomentella is readily enough distinguished in its place of growth, from every other species, no less by its very pale color, than by the extent of ground occupied by its tufts. It bears considerable affinity with the *J. ciliata* of Linnaeus; but, besides the great difference in color (*J. ciliata* being always more or less of a rich yellow-brown), our present plant is much less convex in the upper surface of its leaves, which are divided into far narrower segments, and the lacinae are considerably longer, and more numerous, as well as greatly more branched, than in the case with that species, in which, moreover, the stems are almost always procumbent. In the Banksian Herbarium, as well as in Dr. Smith's and Mr. Turner's, are preserved specimens of a *Jungermannia* from New Zealand and the Sandwich Isles, so closely allied to this, that I cannot do otherwise than mention it as a variety; and, indeed, I am unable to point out any difference, except in the ramification, which in the exotic specimens is simply pinnate, and in that respect approaches in its mode of branching to *Hypnum Crista-castrensis*, infinitely more so than *J. tomentella* does, as observed by Wren.

Dillenius justly says, when speaking of the figure of this species in Vahl's *Icones*, "non minus pro folia et raris villis bene representat;" indeed, it bears a much nearer resemblance to *J. fusoides* of Swartz's *Flora Indica Occidentalis*, than to our species. It was reserved for the author of the *Historia Muscorum*, to represent with great correctness this interesting plant, and his description is scarcely less accurate. "Ramus scandens," he observes "nervis tenuibus lobis et foliis frequentissimis vestitus, pinnatis vix, nec tantum, pro plantis rationis crassius cunctis,

foliis non æquè crebris cincti superius et per margines, inferius autem geniculati sunt, foliis latiusculis villosis, quibus laniæ figitur, tecti. Here Dillenius considers the stipule as a kind of leaf, but I can by no means agree with him in supposing that, by help of that part, the plant is affixed to the ground, though it is probable that roots are produced immediately from its base, by which the plant may be attached to the soil, or to other individuals of its own species.

Ehrhart, in his *Beiträge*, first applied to this species the appropriate name of *tomentella*, and described it with his usual perspicuity. Weis, on the contrary, Weber, Hudson, Withering, and even Lamarck, in his *Encyclopædie*, have confounded it with the true *J. ciliaris*.

The older Botanists called this plant *Muscus Absinthii folio*; but a more striking comparison would have been with the leaves of the *Ceratophyllum*. Tournefort adds, *insipidus*, while Dillenius remarks, *insipidus non est hic Muscus, sed subacris non tamen acutus*. To me, however, it appears to be tasteless, or at most to have only a flavor, which it might inhale from the earth.

The fructification represented on the plate was drawn from the specimens in the Linnean Herbarium.

REFERENCES TO THE PLATE.

W10.

- | | | |
|----|--|---|
| 1. | <i>J. tomentella</i> , natural size. | |
| 2. | A female plant of the same, natural size. | |
| 3. | Portion of the stem and branches, seen from beneath, magnified. | 6 |
| 4. | A leaf and stipule | 3 |
| 5. | Calyx and capsule | 8 |
| 6. | Calyx, longitudinally dissected, with the young capsule, footstalk, and its bulb | 3 |
| 7. | Perichæcial leaves. | 2 |
| 8. | Seeds and spiral filaments | 1 |





Juniperus crenulata

JUNGERMANNIA CRENULATA

(TAB. XXXVII.)

JUNGERMANNIA, caule procumbente, ramoso foliis rotundatis, marginatis fructu terminali, calycibus obovatis, crenatis, longitudinaliter quadrangularibus; ore contracto, dentato.

Jungermannia crenulata. Engl. Bot. t. 1463.

J. gracillima, caulibus gracilioribus, foliis minutis, distantibus.

Jungermannia gracillima, Engl. Bot. t. 2238.

HAB. Bogs at Amberley, Sussex. *Mr W. Borrer, Jun.*—On the boggy parts of Holt Heath, Norfolk. abounding among *Conifera Erectorum*. *Rev. R. B. Francis* Near Duntry. *Miss Hutchins.*—At Howth and Powers-court, Ireland. *Dr. Stokes.*—Plentiful in the New Forest, Hants; and at Kinnordy, Kerrie-muir. Scotland. *Mr. Lyell.*—Epping Forest. *Mr. E. Forster*—Mountains in Scotland. *Mr. George Don.*—About Edinburgh. *Mr. Slater.*—On wet parts of Lound and Westken Hoads, Suffolk.—(The male fructification has been detected by *Mr. Lyell* in the month of July. The female is found in perfection in the early spring months.)—*J.* is not uncommon, growing with *s.* —*Mr. Lyell* finds it in great plenty in the New Forest. and *Mr. Francis* upon a loamy soil in Edgefield Wood, and by the road sides in its vicinity.—(Young fructification is tolerably plentiful in the months of October and November.)

THIS PLANT* grows in rather densely-matted patches of various, but generally considerable, extent. *Roots* simple whitish fibres, which descend here and there from nearly the whole length of the under surface of the plant. *Stems* from an inch to nearly three-quarters of an inch in length, filiform, somewhat flexuose rarely simple, mostly once or twice irregularly divided, with rather slender and simple branches, which gradually lessen towards the extremity. *Imbrications* also resembling these, but still more slender, are frequently produced. The texture of all of

* *Female specimens* seem to be the most crowded in their mode of growth, and I possess, from *Mr. Lyell*, a leaf, which forms almost an entire rosette of calyces.

(*J. crepula*.)

BRITISH JONGERMANNIÆ.

Stem is tender, and composed of numerous *cellules* which are readily distinguishable with the microscope. The color is a dull green, at the apices frequently purple.

Leaves (f. 3) by no means closely placed in the barren shoots, but crowded and imbricated in the fertile ones, in the former they are considerably smallest; in the latter the upper ones, which are the largest of all, are nearly half a line in length in many instances, erect, gradually leaning as they recede from the calyx, the rest, on the contrary, become smaller in proportion as they approach the extremity, and are generally patent, all of them are of a nearly orbicular figure (the lower ones sometimes inclining to ovate), concave, with the margins usually plane. Their texture is somewhat coriaceous; the *cellules* are small, roundish, except at the margin, where they are of a much larger size, regularly quadrate, forming a curious and very conspicuous border, which is still more remarkable in a dry state, when it becomes a little recurved, and is distinguishable by that circumstance, and by a somewhat paler color, even with the naked eye. The extreme edge of each of the marginal *cellules* is often swollen, thus forming the segment of a circle, which, of course, gives the leaf a crenulated appearance, whence the name adopted by Dr. Smith. This is, however, by no means universally so, nor have I ever seen the leaf altogether so much crenulated as the figure in *English Botany* represents it to be. The border itself is not unfrequently very obscure in the younger leaves, and is none so evident as in those upon the fertile shoots. The color of the leaves is extremely variable. I possess specimens, gathered by Mr. Lyell, which are wholly green, but the most usual hue is a dull olive, with the extremities often, and the terminal leaves generally, altogether of a rather deep purple.

The *Perigonææ leaves* resemble the rest, except that they are more crowded and their base is swollen for the reception of the anthers. They are situated in various parts, but most frequently about the middle of the stem.

Perichætal leaves differ in no respect from the rest that are placed upon the fertile part of the stem. When the calyx is young they form a sort of cup around its base, and when that part has reached its full size they are about half its length or more, and are closely appressed to each side of it. They sometimes appear to have their origin from the lower part of the calyx itself, but this is by no means constant for the calyx and perichætal leaves will often be found to have one common point of insertion, at the extremity of the stem.

MALE FRUCTIFICATION situated in the axilla of the perigonæal leaves, in clusters, consisting of two or three, or more, *anthers*, each of which is spherical and reticulated, and supported upon a short, whitish footstalk.

FEMALE FRUCTIFICATION * terminal* upon the main stems.

The *Colpe* (f. 5) is three-quarters of a line or more in length, of an obovate figure, laterally compressed, and furnished with four longitudinal angles, which, in the full-grown calyx, are prominent and acute, but in the younger state far less evident and obtuse at which time, also, the whole calyx is more spherical, and may readily be

* Unless, indeed, in any species with almost every species of the genus, the production of a shoot immediately beneath should give it the appearance of being lateral. This seemingly lateral insertion may be more easily distinguished from a truly lateral one, in consequence of the much larger calycæous leaves, on the upper part of the main stem.

BRITISH JUNGERMANNIÆ

(*J. crenulata*.)

supposed, by those who have not the opportunity of tracing it to perfection, to belong to a different species. The mouth is much contracted and sometimes even prominent, always irregularly toothed. The color and texture correspond with those of the leaves.

Calyptra (f. 8) Obovate, delicate, of a pale yellowish-brown color, elegantly reticulated, and terminated by a short style.

Peduncle half an inch or more in length, white, pubescent, villulose.

Capsule (f. 9) ovate, approaching to spherical, of a deep, shining brown color, longitudinally and transversely furrowed.

Seeds and spiral filaments (f. 10) of a fulvous color; the latter are formed of a double helix, and adhere, after the discharge of the seeds, to the margins of the valves of the capsule the former are spherical.

The var. *β*, *J. gracillima* of Engl. Bot. is smaller in all its parts than *α*; the stems, too, are more lengthened and slender, and are furnished with very minute, distantly-placed, and more ovate leaves, at least on the barren shoots, for the fertile ones differ in no respect from those of *α*; like them, too, being very distinctly bordered with large, quadrata ciliolata, whilst in the rest this appearance is far less observable.

The present species, which belongs to that division which may be called "*Ecstipulata, foliis distichis, integris*," is at once to be distinguished from the rest of the same tribe, by its quadrangular calyx, and its curiously margined leaves. In some of these, however, as has been already remarked, especially of the var. *β*, the border is obscure, and they then bear an small affinity to those of *J. scalaris*, from which, at the same time, the want of stipules will always keep the plant distinct even should the fructification be wanting, which is totally different in the two species in question. Leaves of the kind just mentioned have some resemblance in figure to those of *J. pumila* and *J. lanceolata*, but besides that these last are always of a more delicate texture, their far greater size, in proportion to the diameter of the stem, and their more crowded mode of growth, will prevent them from being mistaken for those of *J. crenulata*. As I am not aware that there is any other species that is at all likely to be confounded with the present, it will be unnecessary for me to say more on its specific characters. With regard to *J. gracillima* of English Botany, the sterile plants have a very peculiar appearance, but the true mark of the species will be found in the fertile shoots, and I am particularly happy to be able to add, that Mr. Lyeil, who has been at great pains in examining and comparing the two, and long thought them distinct, now perfectly coincides with me in considering them merely as varieties of each other. *β* may often be found with *α*, as well the intermediate states of the two.

Rocky places in various parts of the united kingdom produce this pretty plant. Mr. Francis has for many years remarked it in the neighborhood of his residence but Mr. Borrer's specimens, found in Sussex, are those that have been first published. These grew to a larger size than the Norfolk plant. No author but Dr. Smith has noticed the species, and, indeed, does it appear to be an inhabitant of the continent.

REFERENCES

REFERENCES TO THE PLATE.

FIG.		
1	<i>J. crenulata</i> , natural size.	
2	The same, magnified .	6
3	Portion of a saccus with leaves	4
4	Calyx	3
5	Section of the same	3
6	Barren petiole	1
7	Stem	2
8	Calyptra	2
9	Capsule	2
10	Seeds and spiral filaments	1



Juncus germanicus inflatus

JUNGERMANNIA INFLATA.

(TAB. XXXVIII.)

JUNGERMANNIA, caule prostrato, simplicis, vel ramosi foliis subrotundis, concavis, acutis
bifidis, segmentis rectis, obtusis: fructu terminali, calycibus pyriformibus, ore contracto, dentato.

Jungermannia inflata. Huds. Angl. p. 511.

Jungermannia heteromala. SCHKIMPPEL, Icones. p. 246. t. 64. f. 1. (excl. sign. DILL.)

Jungermannia bifidifolia. var. 2. WITT. III. p. 853.

HAB. Moist and frequently boggy places in various parts of England, Scotland, and Ireland.
In Sussex it abounds on the chalky downs.—(Mr. Lyell finds the mothers in July, in the
New Forest, Hants.—Calyces are found during the greater part of the year, but capsules
have been met with only by Miss Hutchins and Dr Taylor in Ireland during the early
spring months, and by Mr. Lyell in the New Forest, in July, and again on the ninth of
January, 1833.)

PLANT growing in very densely-matted patches of considerable extent, conspicuous from their deep
green or almost black color.

Root consisting of numerous, minute, short, whitish and simple fibres, thrown out here and
there from the greater part of the under side of the plant.

Stems from a quarter to half an inch, or rather more, in length, prostrate, slender,
rhizom. flexuose, simple, or, as is frequently the case, bearing two or three simple
scattered ramuli, which are either like the parent stem, prostrate (f. 4, or erect (f. 5),
when the plant grows among grass or moss. The color varies from a pale green to an
olive brown. The texture is rather firm, composed of oblong cells. Innovations are now
and then found arising from various parts of the stem, which much resemble the
smaller branches.

deinde apicem, glomeratus, tenues rufus complures, qui initio parvos, tandem majores distichis grandiores aut, graciles subrotundis conflatos. Hæc granula tandem dispersantur, et per dorsum prius deficiunt, tandem per superiorem foliorum discurrunt sub forma punctatam rotundiorum. Unde hæc granula acriter distinguere nonnulli possunt. Intersum triviale foliorum ovigine et rufus granula, vel marginales, et parte eadem colore perfunduntur, qui in granula complures. Intersum in ipso frondibus dispersis, in aliquot foliis superioribus, item hæc ultimam disticham.*

To our countryman, Mr Hudson, is due the credit of first distinguishing the present plant, which has not recently long been published, though no other author since his time seems to have spoken of it of his own knowledge, except Schmidt, who, in the place above quoted, has given a figure as admirable as is his description. From the lapse of time not being myself, at the time the plate was in hand, acquainted with the perfect capsule I have copied the representation given at f 4. Of the species in question being the *typica* of Hudson I can speak with certainty having had the opportunity of comparing it with his original specimens, and being also furnished with others, which Dr Swartz gathered in England, when in company with its discoverer. In Germany according to Schmidt, this plant seems to be not uncommon, and in Sweden it is not less abundant than it is in Britain. Dr Swartz informs me that it grows near the rhyolites arising from the copper-mine at Fahlun. K. Collins *novus*, he writes upon the cover of one of the numerous specimens that he has communicated to me, "*capitulum Fahlunense adpressum* 346 *Ficus pauciflora* ab rhyolite metallo fusi — *Nulla alia res generis huius invenitur quàm hæc quæ in dorsis alginis super terram erigit*" In this situation *J. typica* seems to flourish, though it is destitute of fructification.

The singular form of the full-grown calyx of this plant, and the obtuse segments of the leaves, together with the deep olive or almost black color, are marks by which *J. typica* may be known from every other and after the accurate character given of it by Hudson, and the adequate description and figure by Schmidt, it is not a little remarkable that Roth should suppose it could possibly be a variety of *J. menz.*† His words are "Hinc (*J. locustæ*, *gracilis* nunciat vel eodem sit, *J. brevifolia*, Schum. Habitat totius pinetis cum idem cum nate, quævis sibi constanti habitu distinet, quæ in nostris regionibus pinetis sunt sit sunt et phrygæis (videtur observatur). Fl. Germ. III. p. 308. Wetherling, n. n. has fallen into an error no less striking when he has made it his var. 4 of *J. heterophylla* (not *J. heterophylla*). To this mistake he was probably led by Schmidt's quoting erroneously (though he has done it doubtfully) the Dillmann species, t. III. f. 14.

Schmidt has noticed more than one fertile germine within the calyx, a peculiarity that is not confined to this species. I have remarked it in *J. marginata* (see t. XXVII.) and in *J. repens*.

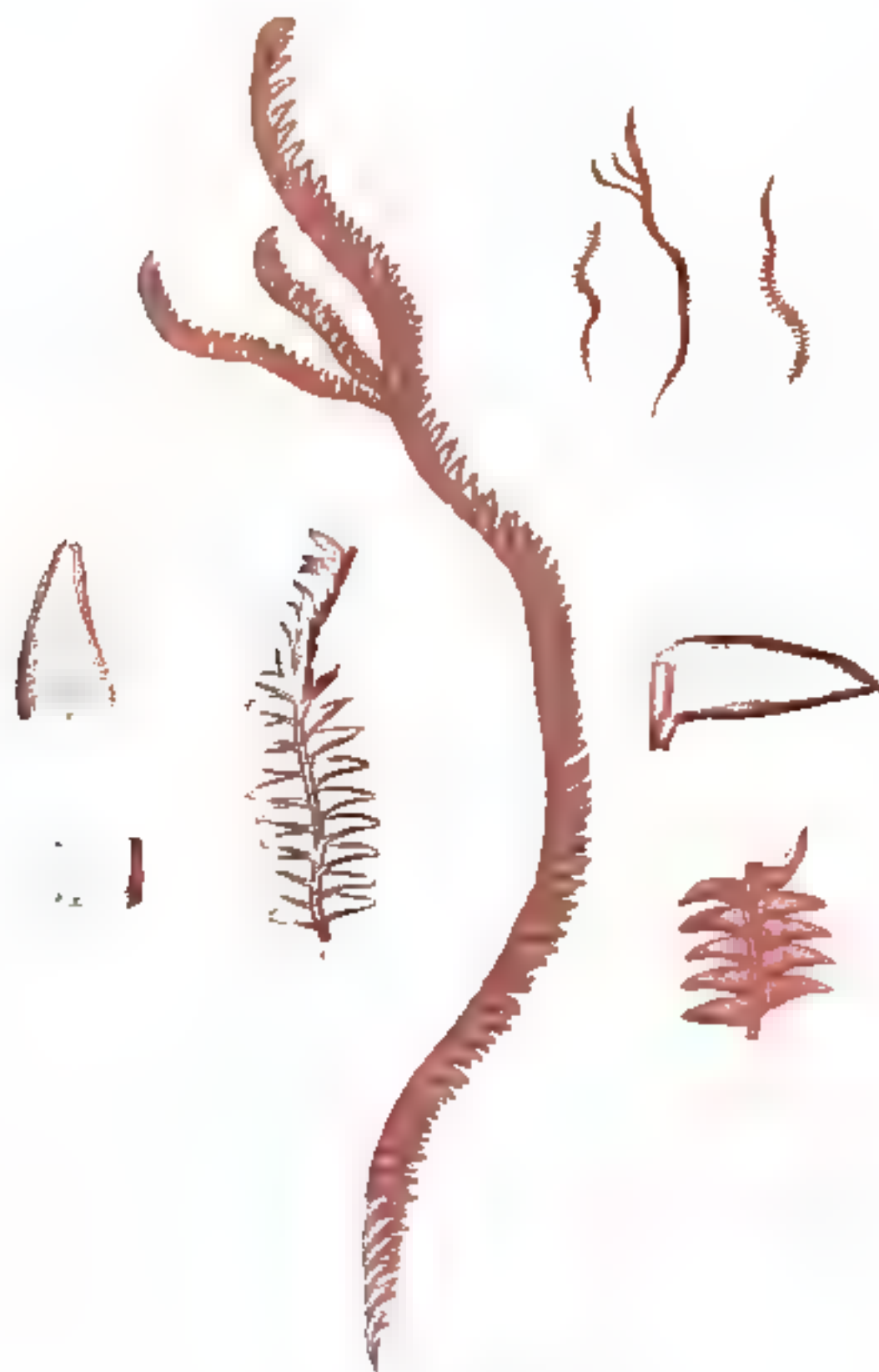
The fructification of *J. typica*, in a perfect state seems to be very rare, but the calyxes are extremely abundant; and these, like the sterile calyxes of *J. ocellatus*, are broken off with the slightest touch.

* A variety of *Jungermannia repens* has lately been found by my friend, Mr. Finner, being gemme as the form thus far best described by Schmidt, that, were it not for the accidental discovery of this variety, I should almost be led to suppose that he may have overlooked the two. The color of the things in both is very similar.

REFERENCES TO THE PLATE.

FIG.	
1, 2, 3. <i>J. inflata</i> , natural size	
4. Fertile plants, magnified	6
5. Barren plant	6
6, 7. Leaves	4
8. Apex of a stem and a calyx	4
9. Section of the calyx	3
10. Barren parthia	1
11. Capsule	2





Pinetum pinnae *Pinetum*

JUNGERMANNIA DONNIANA.

(TAB. XXXIX.)

JUNGERMANNIA, caule erecto, subulapilifer, filiformi. Sexuoso: foliis arcuè imbricatis, subtriangularibus, oblongo-ovatis, concavis, apice bidentatis, falcato-secundis.

HAB. Discovered by Mr. George Donn, in 1795, upon the highest mountains of Clava, in Angus-shire, and on Ben Lawers and Ben Nevis; again found in 1802, on Cairngorms, and in September, 1802, on Ben-ne-bord and Ben-blue-Duick, two mountains North of the Dee.

PLANT growing in rather small and loosely-entangled tufts, intersixed with other species of *Jungermannia* and Mosses.

Of the roots, I have not been able to find any traces, and, indeed, the lower part of the plants (whence, probably, the roots originate) are so much matted together, and so brittle, that it is scarcely possible to separate an entire individual from the tuft. Stems from one to two or even nearly three inches in length, and about the thickness of horse-hair, erect, filiform. Sexuoso, of a rigid, and, in a dry state, fragile nature, somewhat ligneous, opaque, exhibiting no cellular texture, of a purplish-brown color, often verging to a black, either simple, or occasionally interrupted by one or two scattered young shoots, which, except in size, differ in no respect from the parent stem.

Leaves (f. f. 3. 4. 5.) closely imbricated in a bifurcous manner over the posterior surface of the stem, and with great regularity throughout its whole length, about half a line long, of an oblongo-ovate figure very concave, having the sides not unfrequently incurved; at the base they are slightly decurrent at the apex divided by an acute sinus, which is often concealed by the involute margin of the extremity (see f. 5), into two small, and rather obtuse teeth with regard to position they are nearly horizontal, slightly falcate, sometimes distichous, (f. f. 3. 4.) but far more generally

imbricatocuneata (f. 4). The texture of the leaf is rather firm, brittle when dry the cells are very compact, extremely small, ovate or oblong, and may often be observed to be arranged in longitudinal series, many of the cells are opaque, whilst others are semi-transparent, as is represented at f. 5. Their color is rather a deep, purplish-brown; at the base of the plant, of a dirty hue.

Mr. George Donn, of Forfar, communicated specimens of this plant, which he gathered in 1795 both in the Clava and the Brevalbanne mountains, to Dr. Smith, a few years since, marked "*J. adnata* of Dickson (the *J. juniperina* of Swartz and this work). On its being ascertained to be a new species, my kind friend, Mr. Lyell, applied to Mr. Donn for other specimens, which he had been so fortunate as to gather on another of the Scotch mountains, in 1802, and he has subsequently informed me of two new stations for this plant, detected in September, 1813. It is a species the most distinct of any I am acquainted with, and, among the British Jungermanniæ, is perfectly "out-generis; though, in mode of growth, and in the disposition of the leaves, some kind of affinity may be observed with *J. juniperina*. In the shape of the leaves, as well as in their direction, it bears a nearer approach to a large, and, I believe, undescribed species found at St. Helena, but, besides the much smaller size of the former, the color of the two are totally different. Of our present plant, unfortunately, no fructification has yet been met with. It appears to be confined to a few of the loftiest of the highland mountains, and, even in these situations, has only been seen by its discoverer, whose name it bears, and who has contributed so much by his indefatigable industry to the Flora of the British Isles.

REFERENCES TO THE FIGURE.

FIG.

- | | | |
|---|---|---|
| 1 | Plate of <i>J. Donalana</i> , natural size. | |
| 2 | An individual magnified | 6 |
| 3 | Portion of the same, seen on the anterior surface | 4 |
| 4 | The same, seen on its posterior surface | 4 |
| 5 | A leaf | 3 |
| 6 | Portion of ditto | 2 |
| 7 | Smaller portion of ditto | 1 |





Sargassum polyceratum

JUNGERMANNIA PLATYPHYLLA.

(TAB. XL.,

JUNGERMANNIA, caeruleo procumbente, planisq. ramoso foliis bilobis, inaequaliter bilobis; lobis superioribus majoribus, rotundato-ovatis, subintegerrimis; inferioribus stipulisque ligulatis, planiusculis, integerrimis fructu laterali, calycibus subovatis, compressis, ovis truncato, inciso-seriato, hinc longitudinaliter semibifidis.

- Jungermannia platyphylla*, LINN. Sp. Pl. ii. p. 1800. Syst. Nat. ii. p. 706. GOUAN, Montp. p. 452. POLKIN, Pal. iii. p. 196. LAMOUR., Herb. p. 363. WEIS, Plant. Crypt. p. 135. WILLD. Her. p. 349. OBERL. Enum. Pl. Fl. Dan. p. 49. ALLIONI, Fl. Ped. ii. p. 314. VILLARS, Delph. iii. p. 296. ROTH, Germ. iii. p. 406. HOFFMANN, Germ. ii. p. 87. HUBER, Angl. p. 615. LIECHT. Sem. ii. p. 734. LAMOUR. Syst. Nat. ed. Gmel. ii. p. 1351. WITM. iii. p. 861. LAMARCK, Fl. Fr. ed. 9. i. p. 433. REICHENB., Cons. p. 432. Engl. Bot. t. 739.
- Jungermannia cypripediformis*, β. LAMARCK, Encycl. Method. iii. p. 383.
- Muscoides squamatum major, atro-virens, foliis subrotundis*. MICHELX., Nov. Gen. p. 9. t. 6. f. 3.
- Muscoides squamatum medium, rotundifolium, atro-virens*. MICHELX., Nov. Gen. p. 10. t. 6. f. 4.
- Hepaticoides foliis subrotundis, squamatum incumbens, major*. VAILLANT, Bot. Par. p. 100. n. 6. t. 18. f. 9.
- Jungermannia foliis subrotundis, densissimis, et imbricatis dispositis, viridis, minor* RUTT. Jen. t. p. 345. ii. p. 324. (Idem Dill.)
- Lichenastrum arboris Fila foeta, foliis vix rotundis*. DILL. Hist. t. 72. f. 52.
- Jungermannia foliis imbricatis, lanceolatis, superius planis alternis, inferius concavis, quinqueforis*. HALL, Fl. iii. p. 61. n. 1872.

β. (t. 4) **MAJOR**, caeruleo (ut in α) vagè bipinnatim ramoso; foliis majoribus, hirsutis, flavo-virescentibus.

γ. (t. 2 & 3) **THUJA**, caeruleo elongato, simpliciter pinnatim ramoso, foliis hirsutis, fuscescentibus,

Jungermannia Thujæ DICKS. Plant. Crypt. Fasc. 4. p. 19.

Jungermannia platyphylla, β. WEIS, Plant. Crypt. p. 136. WITM. iii. p. 861.

Jungermannia cypripediformis, γ. LAMARCK, Encycl. iii. p. 383.

Muscoides squarrosum, sessile, maximum, compactum, ex apertis circumis, foliis subrotundis non nullis denticulatis. MICHELL, Nov. Gen. p. 9. t. 8. f. 1.

Lichenastrum Arberii Vile facie, foliis rotundioribus. DILL. Musc. t. 78. f. 33.

Jungermannia, foliis imbricatis, leucodentis, superni plantæ, alternis, inferi communi, quinqueferis. HALL Metz iii p. 81 n. 1872. var. β .

HAB.— α is extremely abundant upon old walls, rocks, and even on the trunks of trees, in various parts of the kingdom, flourishing within the influence of the smoke of large towns. — β has hitherto been found only in Ireland, by Miss Hutchins, upon stones by the side of Congaun Derra Lake, among the mountains near Bally — γ was first discovered in this country by Mr. Archibald Menzies, in August, 1778, growing upon trees on the North side of Loch Ness, in Scotland. — It has since been gathered by Mr. Templeton, on moist rocks, by the side of a waterfall near Carrifergus, in Ireland. — (Upon α the female fructification is produced in March and April but some of Mr. Menzies specimens of the β , which he has been so good as to furnish me with, contain perfect capsules, gathered in August. — Mr. Lyell has detected the male fructification in the month of March.)

This Plant grows in considerable patches, with every individual imbricating each other, as is the case with *J. Hutchinsii*, or, to use the words of Dillenius, "Magnis compilation et numerosa serie imbricis congesta, arboribus et muris adhaerens hic muscosus."

The roots are with difficulty discoverable, a few rigid, extremely brittle, and somewhat ligneous fibres, may now and then be seen to descend from the lower part of the plant. Stems from one to two and three inches in length (or even five inches, in β and γ), scarcely so thick as small punkthreed, very flatness, and pinnated often with straggling branches, in some instances with much greater regularity than in others these pinnae are not unfrequently again divided with short and nearly horizontal single pinnules. Their texture is firm, opaque, and even woody below, but, towards the extremity, the cellular texture is very visible. The color varies from a deep brown to a yellow, but dirty green.

Leaves closely imbricated in two rows, as is wholly in contrast the upper side of the stem; they are unequally two-lobed, having the upper one considerably the largest, and nearly three quarters of a line (in γ more) in length, often largest at the extremity of the branches, distichous*, alternate, horizontal, ovate, approaching to round, slightly concave above, with the margins, particularly at the apex, incurved, entire, or here and there very slightly toothed the lower lobe or lobule is ligulate, dimidially appressed to the inferior surface of the upper one, plane, having the margins only recurved and entire. The color of the leaves is a deep, and sometimes blackish-green, opaque, from brown glass in α , the texture is rather compact; the cellules minute, rounded (E 11).

*Dillenius has been very happy in his description of this species, of the leaves in particular, "foliis imbricatis nonnullis congestis, apertis vix a dentibus distinctis, a sinuibus ad apicem impunctis, apertis, ovatis, pinnatis, communis videntur, non ad apicem videntur, apicibus et marginibus dentibus dentis, in apice videntur folia apparent."

BRITISH JUNGERMANNIÆ

J. platyphylla, J.

Perigynial leaves (f. f. 6, 7) closely imbricated upon short lateral ramuli, so as to form an ovate compact mass, not much unlike the spicule of a *Brier* (f. 6; each is smaller than one of the common leaves, and divided into nearly equal, very acute, not appressed, lobes, resembling those of *J. repens*, and having their margins & their involute, and altogether free from denticulation.

The **Perichetial leaves** scarcely differ from those of the stem, except that they are smaller, and that the lobule is somewhat larger in proportion to the lobe. There are two in each calyx.

Stipules (f. f. 10, 11); of these there is one in each pair of leaves, arising from the under side of the stem, and appressed to it. It is oblongo-ovate or ligulate, much resembling the lobule, and in the manner recurved and entire.

MALE FRUCTIFICATION (f. f. 5, 6) situated in the axilla of the perigynial leaves. There is one **strobilus** (f. 1) in each of them, which is large, in proportion to the size of the leaf, and presents an exterior reticulated cuticle, but within is filled with a minute greyish granulated substance. The footstalk is scarcely more than half the length of the strobilus, white, transversely striated.

FEMALE FRUCTIFICATION internal, arising from the under side of the pinnæ.

Calyx (f. f. 14, 15) a line or more in length, ovate, narrow and cylindrical at the base, but gradually becoming wider, at first compressed and flat, at length, for the emission of the capsule, erect and nearly cylindrical. The mouth is truncate, semi-acute, and cut with a deep notch, on one side, which extends nearly half the length of the calyx.

Petals, eight or ten in number, ovate-lanceolate, of a greyish color, longitudinally and transversely marked with darker lines; the mouth a little expanded.

Calyptra exactly spherical, contracted at the base, which forms a kind of footstalk; it is rather carinate but slightly marked with a roundish reticulation, and terminated by a short tubular style.

Peduncle scarcely equal in length to the calyx, whitish, cellular, tipped with the perfectly spherical

Capsule, of a pale yellowish-brown color (f. f. 15, 16) on bursting, which it does from the apex, the four equal valves extend no more than half the length of the capsule, and never appear to expand, but, even when old, continue erect. The texture of this capsule is particularly delicate, and, under a highly magnifying power, exhibits a reticulated structure, very much like that of the calyptra, but having, on the borders of the valves, a granulated appearance (f. 19).

Seeds (f. 20) numerous, by no means perfectly spherical, of a pale olive-brown color

*Dillenius says it is twisted as well as lateral, which I have not observed to be the case. In other respects, his description is very accurate. "Ab interno parte ex qua vixit vagina oritur semina membranacea, subrotunda, pediculis brevibus brevioribus, & compressis circumscriptis in arcuatum solum longitudine cylindricis, marginibus tendentibus, in aperturam ab interno orificio, deinde rursus, membranaceis involvis, non angulatis, in quibus grana sunt semina, minus, ubi contracta, sphericis, in fovea latero-externa declinatis."

Spiral filaments (F. 91) fulvous, apparently enveloped in a delicate, pellucid tube; but whether or not these are affixed to the ends of the valves, or, as I rather suspect, to various parts of the interior of the capsule, I have been unable to determine.

The variety β , *major*, is remarkable for the size of its foliage, which is twice as large as that of α , and for its being throughout glaucous — the stems are equally irregularly pinnate.

For γ has the stems much elongated and regularly, though distantly, pinnated with short and horizontal ramuli that are mostly simple. The leaves gradually, at least in many instances, become less, as they approach the extremity of the plant, and are glaucous. And, in all the specimens that have come under my observation, of a yellow-brown color — The two varieties differ in no other particulars from α , and intermediate stages, even of these, show that the marks here laid down are by no means strictly to be depended upon.

J. platyphylla, which in Britain is extremely abundant, and is said, by Dillenius, also to be a native of Virginia and Pennsylvania, is subject to considerable variation in appearance, whence some botanists have been led to form from it two species, which seem, indeed, at first sight, sufficiently distinct. yet, on a more minute investigation, it will be readily ascertained in how slight a degree a character taken from the general habit is to be depended upon. Perhaps even the *J. levigata* of Schrader and of this work might to be considered as a fourth variety, but as I have already, under that species, expressed my doubts, as well as pointed out the only differences that I have been able to find between them, it will be unnecessary for me here to repeat either the one or the other. There is no other *Jungermannia* that I am acquainted with, with which there is the least chance of *J. platyphylla* being confounded. With regard to its affinity, I am at a loss to say to which of the families it naturally belongs in the division of "*Stipitate. folia inaequaliter biploba. lobis inferioribus brevioribus pinnatis*:" for, while, on the one hand, it resembles *J. cuneolata* and *ciliata* in the structure of its foliage, on the other, it greatly differs from them in its fructification — and in the short valves of the capsule agrees with a very natural family, consisting of *J. serpyllifolia*, *J. humulifolia*, *J. calyptrifolia*, and *J. minutissima*, which in other respects it is, nevertheless, extremely unlike.

I have omitted, in the above synonymy, many references to the older botanists, which are mentioned in Dillenius and Michx., because, from their short and imperfect characters, it is not possible to quote them with the least chance of being correct. Michx.'s figures are more to be trusted than his descriptions. His representation of the ramuli, containing the male fructification, is very accurate as in his description. The anthers, it is well known, he looked upon as the seeds, and of these he says, that they are found "*non in externâ foliorum parte, sed recondita in alio squamiformi cujusdam fructu, qui locustarum Graminis aemulat formam per se freva, per caruculos vel per plures non floriferus inaequali solus.*" His figure of the var. *Thaps* is much larger than I have

ever seen the plant, and the representations of α seem to be intermediate between that and γ . By far the most excellent account of this species is given by Dillenius, though I cannot find that the difference, mentioned by this celebrated author, in the leaves of his fig. 33 exists, even in his own specimens. Haller is by no means correct in his remark upon Michell, where he says, "Sporangia ramosa terminalia compressa gemmae, Brier locustis similes, quas pro fructibus Michellius habet: vasa tamen juniores ramos esse, ex foliis serratis communibus facile agnoscamus;" nor is he less inaccurate, when, in speaking of the calyces, he describes them as "rotundi and bivalves." In his var. β (our *Thysa*), he falls into the same error as Dillenius, in attributing to it cordate leaves in opposition to those of α , which he says are ovato-lanceolate. Lamarck, in the *Encyclopédie*, had united this species with his *J. cupressiformis**, making our α the β of that plant, and our var. *Thysa* the γ of it. In the *Flore Française* the excellent naturalist has restored the name *platyphylla*. The var. *Thysa*, however, is unnoticed in that work, from which, probably, we may infer that it is not a native of France.

REFERENCES TO THE PLATE.

FIG.

1	<i>J. platyphylla</i> , natural size.	
2, 3.	Var. γ natural size.	
4.	Var. β natural size.	
5.	Portion of the stem and male fructification, magnified	6
6.	Male rostrulus, seen from beneath	4
7.	Perigonal leaf and anther	2
8, 9.	Anthers	1
10.	Portion of the stem and leaves, seen from beneath	2
11.	Leaf	1
12.	Stipula	1
13.	Perichætiæ leaves	2
14.	Female branch	6
15.	Calyx and capsule	3
16.	Gemma	2
17.	Pistilla	1
18.	Calyptra and capsule	2
19.	Apex of a capsule	1
20.	Seeds	1
21.	Spiral filament	1

* *J. dilatata*, auct.





Jungermannia stipitata

JUNGERMANNIA STIPULACEA.

(TAB. XL1.)

JUNGERMANNIA, caule procumbente, simpliciter foliis rotundatis, apice emarginatis, sinu segmentisque acutis, rectis stipulis magnis, ovatis, acuminate, prope basin margine utroque undulatis fructu laterali, calycibus choratis, apice subplicatis, ore contracto obtusè dentato.

HAB. Shaly rock in Laharn wood, near Bantry Ireland. *Mrs Hutchins*.—Found afterwards at Lough Bray, by *Dr Taylor*; and in Scotland, by *Mr George Down*.

PLANT growing in dense, very compact tufts, or cushion-like patches, resembling those of *J. izida*.

Roots descending in small bundles from the whole length of the under side of the stems, each bundle originating immediately beneath the stipules most abundantly towards the base of the plant. Every individual radicle is simple, whitish, and pellucid.

Stems procumbent, or occasionally nearly erect, scarcely exceeding a quarter of an inch in length, and not more than the fifteenth of a line in diameter. a little flexuose, filiform, or slightly tapering from the base towards the extremity, almost always simple, though I have observed them, in one or two instances, producing young shoots. Their color is a yellowish-green, inclining below to a brown. The cellular are tolerably conspicuous under the microscope.

Leaves (f. 6) bifarious, smallest at the base, gradually becoming larger towards the middle, where they are three-tenths of a line long, but thence diminishing to the apex; they are rather closely placed and slightly imbricate each other, sometimes patent or horizontal, but by far more frequently erect, slightly concave on the upper surface, and convex beneath, a little waved, of a roundish figure, cut at the apex into a rather deep and acute notch or sinus, of which the segments are likewise sharp and strait. The *testis* is thin and somewhat membranous, the cellular small, roundish. The color a pale green, with more or less of a yellow tinge.

The *stipulae* (f. 8), which are very large, when compared with the size of the plant, are ovate, acuminate, plane or but little waved, a little patent or standing out from the stem the margin entire, except near the base, where it is furnished with a single tooth, which is, however, occasionally nearly obsolete. They are of a more delicate texture than the leaves, but, in the cellular and color, exactly resemble them.

(*J. stipulacea*.)

BRITISH JUNGERMANNIÆ

Perichætical leaves small two or three of them surround the base of the calyx. Each is roundish, and cut into three unequal and acute segments at the extremity.

Male Fructification unknown.

Female Fructification (f. 8) lateral; at least, it is so in the only fertile specimen that has come under my notice.

The *Calyx* (f. 9) is obovate, of the same color and texture as the leaves, slightly plicate towards the extremity where it is a little attenuated. The mouth is contracted, plicate, obtusely toothed.

The *Capsula* (f. 10) appears to be equal in width, and even to adhere to the sides of the calyx, of which it is about three-fourths of the length; the upper part only is detached, and is membranous, whitish and reticulated.

Peduncle two or three lines long, white, cellulose.

Capsule ovate, deep brown, striated longitudinally and transversely.

Seeds and spiral filaments (f. 11) reddish-brown, the former spherical, the latter formed of a double helix.

This little species has been detected both in Ireland and in Scotland. Its minute size may have caused it to be overlooked in other parts of the kingdom, but this peculiarity, together with its large stipules, and the prominent situation of these, and their figure, afford striking characters, though, in the latter particular, it very nearly corresponds with another new species (*J. Basiriana*, n. sp.) which has lately been discovered by Miss Hutchins, and which has, like the present, emarginate leaves but it differs in its much greater dimensions, in the less concave, obtusely and slightly emarginate leaves in the small stipules, and in the situation of the calyx, rising quite leafless at the base from the upper side of the stem as that of *J. profla* does. I must here mention another species, found in Scotland by Mr. Lyeil, which has considerable affinity with the present in the size of the stipules, and still more so in their form but, besides that its leaves are twice or thrice as large as those of *J. stipulacea* they afford a more decisive character in their obtuse segments. With the two plants now mentioned *J. stipulacea* will undoubtedly range. They all differ from *J. lidentata* and *J. heterophylla*, in having entire stipules, while these have them deeply divided.

BRITISH JUNGERMANNIÆ.

(*J. stipularum*.)

REFERENCES TO THE PLATE.

x10.

1. <i>J. stipularum</i> , natural size.	
2. 3. Lateral views of the same, magnified.	6
4. Under side of ditto	6
5. Fructified plant of ditto	6
6. Portion of the stem with its leaves and stipules	4
7. Perichartal leaf	4
8. Stipules	2
9. Calyx	4
10. Calyx longitudinally opened to show the Calyptra	4
11. Seeds and spiral filaments	1





Jungermannia aspidophylla

JUNGERMANNIA SERPYLLIFOLIA.

(TAB. XLII.)

JUNGERMANNIA serpyllifolia, caespitosa, filiformi, flexuosa, vagè pinnatim ramosa: foliis distichis, auricularibus*, (sem sub-bilobis; lobis inaequalibus, superioribus majoribus, rotundatis, basi subtilis ventricosis, inferioribus minoribus, involutis) stipulis rotundatis, acutè profundèque bilobis. fructu laterali axillarique; calycibus latè obovatis, pentagonis, obo contractis, elevato, subdilatato.

Jungermannia serpyllifolia. Dicks. Crypt. Plant. Fasc. 4. p. 19.

Jungermannia minima, foliis auratis, ex rotunditate acuminatis, punctatis ac velut perforatis, floribus viridulentis, vaginæ cordiformi. Michx. Nov. Gen. p. 2. t. 6. f. 13.

Lichenastrum, quod *Jungermannia minima*, foliis auratis, ex rotunditate acuminatis, punctatis ac velut perforatis, floribus viridulentis, vaginæ cordiformi. Willd. Musc. t. 73. f. 30.

β. ovata; foliis minoribus, ovatis, sub-acuminatis.

HAB. "In sylvis inter muscos." D. Dickson.—Upon the trunks of trees, very abundant, near Copgrove, Yorkshire.—About Bantry Miss Hutchins. Not uncommon in mountain glens, near Belfast. Mr Templeton.—North Brook, Furzy Lane, New Forest, and upon rocks at Lowdore and Kenwick, and on Castle-hill, Kinross, Scotland. Mr Lyell.—Powerscourt waterfall, with Calycos, May 23rd. Dr Taylor.—Blum Turk, Cunnamara, and mountains near Killarney. Mr Mackay; found about the latter place, also, by Sir Thomas Gage, Bart.—Rocks by the waterfall on the Dee, near Mar Lodge. Mr. George Dons.—(The male fructification is produced in June; the female, during the spring months.)—β. is found upon rocks near Bantry, by Miss Hutchins.

PLANT growing in rather large and dense patches, the different individuals, of which the patches are composed, imbricating each other in a very compact manner.

Stems from half to three-quarters of an inch in length, filiform, flexuose, extremely slender, branched irregularly in a pinnated manner, the various shoots, which are

* I have called the leaf of this species a "folium auriculare," from the close resemblance it bears to the shell, *Hélix auriculata*.

is uncertain as possible in number, length, and situation, being all on the same plane, these are usually simple, but sometimes again beset with a few short, simple ones.

Leaves (f. f. 3-4) rather closely imbricated (at least in *a*) over the whole upper side of the stem bifarious, somewhat two-lobed, having the upper lobe by far the largest, and the sixth, or sometimes even the fourth of a line long, horizontal, ovate, very slightly convex above, the base beneath ventricose, where the lower lobe arises, which, perhaps, might with more propriety be called a dilated and remarkably involuted portion of the margin taken altogether the leaf very correctly resembles a specimen of the *Helleborus* by which comparison its figure will be better understood, than could be the case by means of words. The texture is delicate, the cellulae large, roundish. The color a pale yellow-green.

Perigynae leaves (which I had not seen till it was too late for them to be represented on the plate, closely imbricated upon short stalks, forming ovate compact masses, like those of *J. platyphylla*. They are ventricose at the base, but the lobes are less involute than that of the cauline leaves.

Perichetiae leaves (f. f. 5-13) of quite a different figure from any of the rest, being much larger, and divided deeply into two oblong-ovate lobes and slightly convex lobes, which closely embrace the calyx the upper one is about thrice the size of the lower.

Stipules (f. 3) roundish, plane, cleft above a third of their length into two sharp and equal segments, whose sinus is rather acute, extending about one-third of the length of the stipule.

Male Fructification a single stamen is situated in the axilla of each perigynae leaf. It is articulated, spherical, and terminates a short, white, transversely striated footstalk.

Female Fructification lateral and axillary.

Calyx (f. 6) about twice the length of the leaves, widely rhombic, at the base cylindrical, thence gradually becoming of a larger diameter towards the extremity, furnished throughout its whole length with five longitudinal sharp angles. The mouth small and protruding into a short tube.

Gulperis (f. f. 7-9) extremely thin and delicate, so that the young capsule may be seen within it. The articulation is large, and the orifice oblong; the style, with which it is terminated, is long, tubular, and slightly expanded at the mouth.

Peduncle about twice the length of the calyx, wholly composed of a number of parallel tubes all of equal length, which are placed in distinct bundles, so that by the termination of the several parcels, are formed distinct transverse lines, dividing the footstalk into several joints. In a dry state, these joints are bent with much regularity to the right and left alternately, and give the peduncle a zigzag appearance.

Capsule (f. 9) perfectly spherical, white, beautifully marked with large and roundish reticulations so transparent, that the green seeds may be seen through it, and the extreme edge forms round these a white ring or margin. It opens into four equal valves, which extend only half its length (f. 9), and always preserve their vertical direction, never becoming reflexed, or even patent.

The spiral filaments (f. f. 9-10) are composed of a double helix, slightly twisted, enclosed within a large semipellucid tube, much expanded at the mouth. The seeds (f. 11) are few in number, large, oblong, somewhat angular, of a dark green color.

BRITISH JUNGERMANNIÆ.

(*J. serpyllifolia*.)

The var. *β. ovata* differs from *α* in its smaller size, and in having the leaves more convex on the upper surface and of an ovate figure, acuminate at the point which appears, indeed, at first sight more striking than is really the case, from the circumstance of the margins of the leaves being incurved.

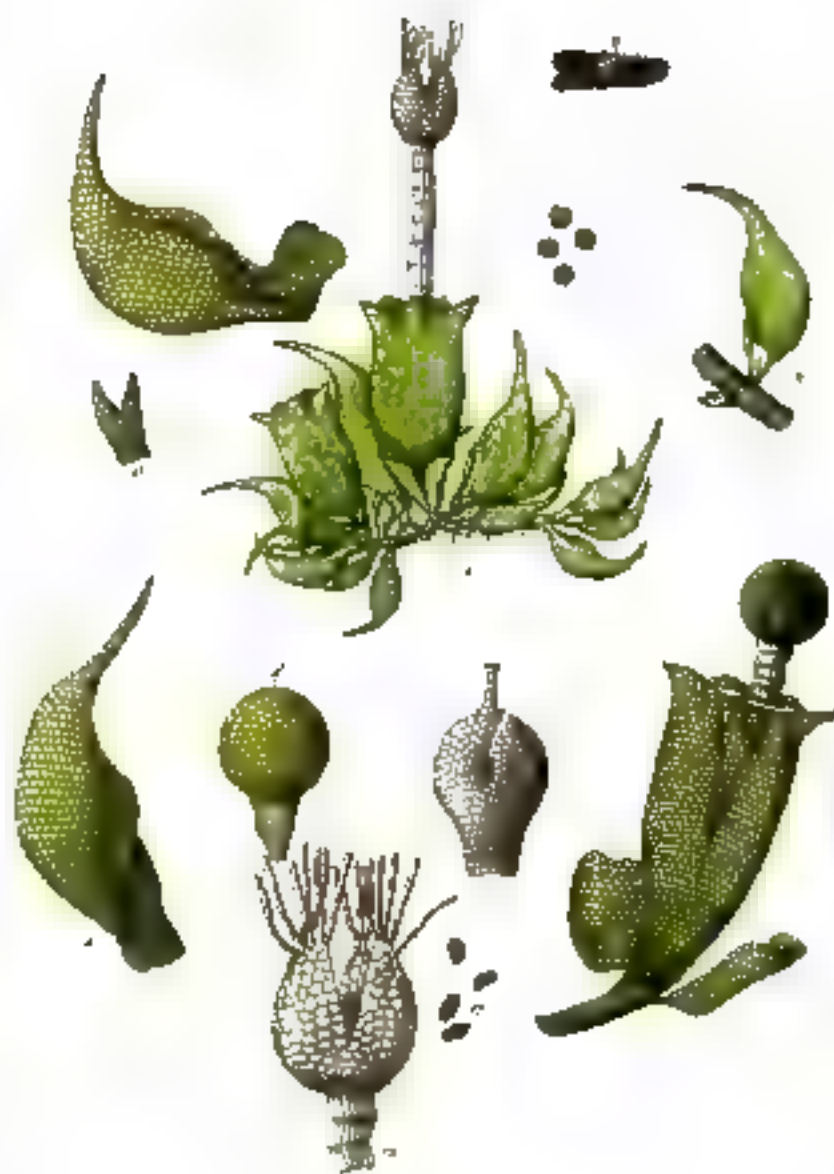
It is not a little remarkable that a species, which does not seem to be confined to a few parts of the kingdom, should, among British Botanists, have found only one author who has given a description of it; and, even among foreigners, Micheli alone seems to have been acquainted with it. This excellent observer has displayed singular acuteness in the figure and description he has given us of this plant, and its diminutive associate *J. minutissima*. Dillenius, however, profoundly ignorant of the plants themselves, has copied both the representation and words of Micheli, not without expressing his doubts as to their accuracy, which he certainly would not have done, had the specimens fallen under his own notice. "Sed verum," is his remark, "ut valde accurate not. ob parvitatem suam capitula videntur Anthere sordum explicatae, in quibus non capio, quid sit pili in summitate. Quæ puncta vocat pinnulae proci subis sunt secundariæ." These "capitula," or "Anthere," as Dillenius considered them, and the "pili in summitate," are very striking characters in the species, though they are not confined to it, since we are now acquainted with four species being thus distinguished; *J. hamatifolia*, *J. calyptrifolia*, *J. minutissima*, and the subject of the present description. To the former of these it is that *J. serpyllifolia* comes the nearest in its foliage, but the calypres will be found to differ materially, as will the leaves, though there is certainly a considerable resemblance between those of the variety described above, and of *J. hamatifolia*; the latter are, however, much smaller, still more acuminate and incurved, and have the lobule or expanded and unrolled margin occupying a much greater portion of the lobe. A difference will likewise be seen in the stipules. Both Miss Hutchins and Mr. Lyell have often found the two species growing together; but they have never experienced any difficulty in distinguishing them.

Mr. Dickson has quoted, as a synonym to *J. serpyllifolia*, DALL. Musc. t. 78 f. 28. instead of f. 30., which appears to have been done through mistake, the former figure being also referred to as his *J. cætes*; a species which I am disposed to consider only an injured state of *J. dilatata*.

Various degrees of temperature seem adapted to the present Jungermannia, which is not only found in Italy, and in the North and South of Great Britain, but also in the still colder climate of Sweden, as I learn by the kind communications of Dr. Swartz.

REFERENCES TO THE PLATE.

FIG.		
1	<i>J. serpyllifolia</i> , natural size.	
2	The same magnified	6
3	Portion of the stem, its leaves, and stipules.	4
4	Simple leaf	3
5	Stipule	5
6	Calyx, perichætal leaves, and capsule	3
7	Calyptra, with the young capsule within	9
8	Calyptra burst	2
9	Capsule, seeds, and spiral filaments.. .. .	2
10	Spiral filament enclosed within its tube	1
11	Seeds	1
12	Perichætal leaves	2



Jungermannia calyptrifolia

JUNGERMANNIA CALYPTRIFOLIA

(TAB. XLIII)

Thallus erectus, subulicrepente, capite, folijs foliolis lobis irregularibus, superstitibus, longioribus calyptriformibus, inferioribus dense junctis, curvatis, stipulis rhombicis sessilibus, lobis lateralibus oblongis, siccis, quinqueangulis apice depressi, piano, are rugulosis.

Hab. On the stems of the *Ulex* near the ground, in heavily mossy places in the neighbourhood of Hamble, interspersed with *J. homolepta*. *Moss* *Hamble*. *near* *Lyons*. Grows in growing interspersed with the same plant upon rocks at *Hamble*.

This singular Plant grows a little pale green tufts, scarcely half an inch in diameter.

The stems are distinctly scattered about the whole side of the stems, and are composed of extremely minute, whitish, pellucid, saucy fibres.

Stipules from one to one and a half, rarely two, lines in length, regular, oblong, broader at one end, the sides with hard, prominent, parallel striations. They are of a pale green colour, and have the edges very visible under a magnifying power.

The leaves (cf. F. 3, 4, 5) are rather close, plane, oblong, horizontal, parted at right angles, the lower individual at the base of the plant, or lower, further gradually increasing towards the apex of the branches, unequally on sides, having the superior one the largest, although from the crowded mode of growth of the stem, the leaf is not infrequently forced into such a position, that it only appears to be the inferior one, as may be seen in F. 3. However, the leaf is longer, and precisely the shape of that sort of calyptra or cover, which is not called "calyptra". This is evident by the writer, in the specific character, and designates by the term "calyptriform".

In other words, it may be described as oblong, its base narrowed, furnished with a narrow opening, which is about one-half the length of the leaf, is apex longitudo and incurved and acute. The lower one (cf. 5) is subquadrang, having the angle obtuse. It is appressed to the larger one, half enclosing it, and covering the opening of F. 3 & 4. The color throughout is a pale yellow-green; the texture delicate. The retines rather large, roundish.

* The word "calyptra" has been applied in *Plurimifera* to the same plant, and is equally correct. It is not to be supposed that a translation of the word would require a plural figure, as it is not for a similar reason, as an egg.

(*J. calyptrifolia*.)

BRITISH JUNGERMANNIÆ.

Perichætidial leaves (f. 9) varying in number from two to four; erect, closely appressed to the sides of the calyx, of which they are about one-fourth of the length, nearly quadrate, their sides incurved, their apex obtusely and widely emarginate.

Stipules (f. 6) small, oblong, plane, appressed to the stem, or a little patent, divided for about one-third of their length from the extremity, by an acute sinus, into two equal, striate, and acute segments.

MALE FRUCTIFICATION unknown.

FEMALE FRUCTIFICATION lateral.

Calyx (f. 8) large in proportion to the size of the plant, oblong, attenuated at the base, widening towards the extremity, where there are five projecting patent angles or teeth which are very decurrent, extending sometimes one-third, and sometimes even more, of the length of the calyx. Its extremity is depressed, and even flattened, the mouth much contracted, and a little jagged. In color and texture the calyx exactly resembles the leaves.

Calyptra (f. f. 10. & 1) spherical, narrowed and attenuated at the base, strongly reticulated, tipped with a tubular style.

Peduncle about twice the length of the capsule divided by transverse septa into a number of joints, each of which is composed of many minute capillary tubes, thus giving the peduncle an appearance which is observable in those marine *Conferæ* which Mr. Dillwyn has called "*longitudinaliter venosæ*," and, in which, he says, "the filament is an aggregation of several smaller tubes*."

Capsule exactly spherical, white, membranous, pellucid, reticulated, dividing, for half its length only, into four equal, erect, conical segments, which support at their extremities the

Spiral filaments, in the form of a small tuft or pencil; they are few in number, each appears (for I have not been able in the dry specimens to satisfy myself on this point so well as I could wish) to be formed of a double helix, and is enveloped in a thin, pellucid, membranous tube, open and a little expanded at the mouth. The seeds are large, of an oblong figure, here and there obtusely angular, of a dark green color.

Gemmae (f. 7) appear to be not uncommon, and are produced upon various parts of the stem, whence they readily separate, and upon the table of the microscope are seen floating about in the water, almost the instant the plant is immersed. They are larger than the seeds above described, nearly articular, depressed, composed of a few large cells: the color is pale green.

Image: J. calyptrifolia

J. calyptrifolia is one of the most curious species, and the most unlike every other in the Genus, that have been discovered by the two often-mentioned botanists, Miss Hutchins and Mr. Lyell. Hitherto it has always been found growing along with *J. hemisphaerica*, but though so evidently

* Dillw. *British Conferæ*, p. 8. and 40.

of the same natural family, agreeing with it in the singular structure of the capsule, seeds, and filaments, still, the form of the leaves is so different, that no difficulty will be found in distinguishing the two plants.

Although I have called the little spherical bodies, observable upon the stems, *Gemmae*, I ought to remark, that they are quite of a different nature from those minute particles, (to which I have given the same name) that are produced upon the excrecences of the stems or leaves of *J. bicuspidata*, *J. erecta*, *J. ventricosa*, &c.; these having no apparent internal organization, while the former are composed of cellules as large as those of the leaf. Similar *Gemmae* (if such they may be called) are found on *J. muscidissima* and *J. hamatifolia*, and, probably, also (though I have not yet been so fortunate as to meet with them) upon *J. serpyllifolia*.

REFERENCES TO THE PLATE.

FIG.

1	<i>J. calyptrifolia</i> , about twice* the natural size.	
2	A single plant, magnified	6
3	Portion of a stem, and a leaf	5
4	A leaf, with the lobule in its natural position	3
5	The same, with the lobule expanded	3
6	Stipule	2
7	Gemmae	2
8	Calyx	3
9	Perichetial leaves	3
10	Calyptra, inclosing its capsule	9
11	An old Calyptra	9
12	Capsule with its tubes, which contain the spiral filaments	1
13	Seeds.	1

* The figure here referred to, is represented larger than nature; because, to have done otherwise, the instrument of the plant would have prevented its appearing otherwise than as a small, green, shapeless mass.





Juniperus communis

(*J. mitata*.)

BRITISH JUNGERMANNIÆ.

the leaves are more distantly placed, very small, and very unequally lobed. The texture is rigid, especially in a dry state, the cellular small, roundish. The color a yellow-green, much inclining to olive or brown.

Perigonal leaves, more copious than the rest, and even ventricose at the base; but in other respects like them: in general, they are only seen near the extremity of the stem.

Perichætal leaves (f. 6) large roundish, divided into two, or, not unfrequently, three, acute lobes or segments. When only two segments, I have observed a small lobe towards the base; probably the rudiment of a larger one. Their color is paler than that of the cauline leaves, and they are of a more delicate texture.

Male Fructification. *Anthære*, situated in the axilla of the perigonal leaves, two or three in each, spherical, reticulated: the footstalks short white, transversely striated.

Female Fructification terminal.

Colyx, at first globose (f. 7), and wholly concealed by the perichætal leaves, at length becoming obovate, or even obovato-oblong, three-fourths of a line long, a little plaited above, the mouth contracted, and fringed with very minute teeth.

Peduncle half an inch long white, reflexue.

Capsule oblongo-ovate, of a reddish brown color, striated longitudinally and transversely, and opening into four, equal, linear-lanceolate valves.

Seeds and spiral filaments fulvous brown, the former of a spherical form, smooth: the latter composed of two short and closely twisted articles.

Obs. At Isle, on the 21st of July, Mr Lyell discovered *Gemmae* upon this species, bearing a considerable similarity to those of *J. nylata* (as represented by Schmilke) and those of *J. exilis*; but far less compact than the latter, and more confined to the terminal leaves than appears to be the case with the former. They are of a red color, minute, angular, pellucid, presenting no internal organization, collected into small, though by no means compact balls, at the apex of each lobe of the leaf.

The Dillenian plants which come from Greenland, and are preserved in the Herbarium at Oxford, though exactly agreeing with the specimens here figured, as well as with others which have been given me by Mr Dickson, are, nevertheless very unlike the figure and description in the *Historia Muscorum* and, indeed, so much so, that it seems scarcely possible that these latter could have been made from those individuals. The fructification of *J. mitata* was entirely unknown, till detected by Miss Hutchins and Dr. Taylor, in Ireland, and, subsequently, in Scotland, by Mr Lyell, who, alone, has found both anthers and capsules.

This is an elegant and extremely well defined species, and has a peculiarly neat appearance from the circumstance of the leaves being most regularly disposed, all placed in a nearly horizontal direction, and, as it were, in a pinnated manner. In color, it nearly approaches some of the states of *J. nylata*; and some of the leaves bear a considerable affinity with that species, but they have the sides always confluent, and the points more acute. The lower leaves, being

BRITISH JUNGERMANNIÆ.

(*J. minuta*.)

unequally two-lobed, indicates an affinity with the family, "*foliis inæqualiter bilobis*," whilst the upper ones resemble those in the division, "*foliis æqualiter bilobis*." So that, in fact, it holds an intermediate rank though, perhaps, most nearly allied to the former, by the perichætal leaves having a greater number of lobes than the rest, which is never the case with the latter. By means of an authentic specimen, communicated by Dr. Swartz, I am able to add the synonym of Schledicher. The same friend has also sent me specimens which he gathered in Sweden.

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REFERENCES TO THE PLATE.

FIG.

1.	<i>J. minuta</i> , natural size.	
2.	An individual, magnified	9
3.	Upper part of the stem and leaves	4
4.	Lower leaves	4
5.	A trifid leaf	4
6.	Perichætal leaf	4
7.	A young* calyx	3
8.	The same, dissected longitudinally	3

* I was not acquainted with the full-grown calyx, till it was too late to have it inserted in the plate.

—

ERRATUM.—in the description of *J. corallifolia*, second page, l. 39, for *J. minuta*, read *J. panic.*





Jungermannia multifida

JUNGERMANNIA MULTIFIDA.

(TAB. XLV.)

JUNGERMANNIA, fronde linear, erect, carinate, compressed, planatis ramis fractu marginali. ciliis brevissimis; ore dilatato, fimbriato: calyptra exserta, obliquo-cylindrica, tuberculata.

Jungermannia multifida LAM. Sp. Pl. ii. p. 1802. Syst. Nat. ii. p. 707. Fl. Suec. p. 404. LAM., Herb. p. 253. WALL, Plant. Crypt. p. 109. WARR, Spic. Fl. Gœt. p. 159. OED., Enum. Pl. Fl. Des. p. 43. SCHARR, Spic. Fl. Lips. p. 109. SCHUBER, Itoset. p. 213. t. 53. BOY, Germ. iii. p. 412. HOFFMANN, Germ. ii. p. 91. HUD., Angl. p. 517. LAMARCK, Encycl. Bot. ii. p. 237. LAM., Syst. Nat. ed. Gœt. ii. p. 1353. LAMARCK, Fl. Fr. ed. 2. v. ii. p. 498. WITT, p. 851. Engl. Bot. t. 186.
Lichenastrum fimbriata Divisura. DILL. Musc. t. 74. f. 43.

β, *SINUATA*, frondibus latioribus, ramosis, margine sinuatis.

Jungermannia sinuata. DICK., Pl. Crypt. Fasc. ii. p. 16. WITT, p. 851. Engl. Bot. t. 1476.
Ula palustris foliis loricato-maculatis aster divinis. RAB. Syn. p. 64. n. 10.
Mosses terrestres musci, foliis sinuatis, floribus nigricantibus. MACGILL, Nov. Gen. p. 5. t. 4. f. 3.
Lichenastrum Chamaedryos multifida Desverd. DILL. Musc. t. 74. f. 44.

HAB. Moist places upon heaths; also in marshes, and on the sides of ditches; abundant in various parts of Great Britain.—(The fructification is produced in the spring months, sometimes under water.—Germes are found by Mr. Lyell, in November.)

PLANT generally growing in thickly-crowded tufts of considerable extent.

Roots, a few small, whitish, simple fibres, descending principally from the lower parts of the plant.

Fronds from half an inch to an inch and half in length, and half or three-fourths of a line, or more, in diameter, compressed, erect in general, but sometimes, especially in the broader varieties, decumbent and imbricating each other, always branched, but extremely various in their ramification, often being twice or thrice divided in a most irregular manner, with narrow laciniae in every respect resembling the main part of the frond, (L. 7) while, at other times, which is indeed most common, they are seen to be planate

or bipinnate (f. f. 1 2, 3 4) in which case, the pinnae are distantly placed, alternate, patent or horizontal, broad with long remote pinnules, which are again not unfrequently furnished with other still smaller ones—all these at the apex are obtuse, and somewhat dilated, rarely emarginate. The substance of the plant is cartilag., succulent, externally appearing articulated, but within evidently composed of many cellular, which, in the thicker individuals, cause it to appear opaque when held against the light—the thinner ones are more pellucid. The color is a pale green, more or less inclining to yellow, and even brown, after having been long dried.

MALE FERTILISATION (f. f. 8) situated in prominent tubercles, arising from various parts of the frond. In each of these, there are four or five Anthers (f. f. 9), imbedded within the cellular substance, of a nearly spherical figure, sometimes inclining to ovate, reticulated externally, within having a greyish granulated pulvis, around which a pellucid border or limbus is often visible (f. 10). The footstalks are white, and transversely striated.

FEMALE FRUITIFICATION (f. f. 6, 7 16, 17) always arising from immediately beneath the margin, never terminal, but by any means confined to the base of the plant, as some authors have considered it to be.

Calyx (f. 17) very short, somewhat hemispherical, having, however, its base slightly attenuated, its mouth expanded, and cut into numerous short, but unequal, sharp lacinae, which give it a beautifully beaded appearance. In color it resembles the frond, and in texture likewise, except that it is thinner, and the cellular, at the extremity of the lacinae, form a simple series like the joints of a Coniferæ.

Pistils (f. 17) two or six in each calyx, of a pale greyish color, striated longitudinally and transversely, their figure ovate-oblong with the mouth slightly expanded. After impregnation, one of them rises erect, or at most with a little curve at its base, to the height of a line, or even more—then becoming the

Colyptra, oblong, of a nearly cylindrical figure, widening, however, a little, but gradually towards the extremity, its base filling the whole calyx, which is closely appressed to it—its apex is often terminated by a very short and tubular style, but more frequently nothing is there observable but the minute tubercles which cover every other part of the colyptra, and form one of the most striking characters of the species. The whole is of a yellowish white color, the texture thick fleshy, cellular. At the apex, it bursts with a small and jagged opening, for the issuing of the capsule.

Suburic nearly as thick as length, white, cellular, not unfrequently twisted.

Capule large, oblong, brown, striated longitudinally and transversely, dividing, at length, into four equal linear-lanceolate segments or valves, and discharging the

Seeds, which are spherical, and fulvous. The *apert. flamentis* are of the same color, composed of a single lobes (f. 18) tapering at each extremity—they are affixed to the apices of the valves, and there the greater number of them continue to adhere in the form of tufts or pencils after the dispersion of the seeds, and till the capsule itself is in a state of decay.

Gemmae (f. f. 10 19) produced in small loose clusters, beneath an incurved extremity of the stem, whence they are easily detached, and, under a microscope, appear to be composed of a nearly spherical, pellucid, white, and extremely thin cuticle, within containing a mass of a green, minutely granulated substance, which is often collected into three distinct lobes. The individuals, which I have hitherto observed to produce these Gemmae, are such as have neither male nor female fructification.

In the var. β , the *J. stems* of Engl. Botany, I see positive no difference, except that the band is supposed wider, and the divisions or lateral segments are frequently, but by no means invariably so short that the margins appear to be bare and these stems, rather than set into segments.

CHARACTERISTICS.

For want of described specimens of the *J. plants* of Muller, a plant evidently most nearly allied to *J. multigida*, I am unable to point out from my own observation any other marks of distinction by which it may be known from the species here described, than its smaller size, its quite cylindrical stems, and its disposition to be branched principally at the base of the frond. Other characters, however, will be found in the frondaceous, as described by Hedwig, whose remarks on the Authors shall be here transcribed. "Mucosa et cutis in distichis plantulis apice prominenti utriusque plicis utriusque lateris transverse squamulis, utriusque ad subitum lobata. Mucosa de plicis transverse mucosae lobata, in quibus utriusque lobuli utriusque plicis lobata. Mucosa de plicis utriusque lobata, deinde plicis lobata, transverse utriusque plicis lobata." And, besides the difference in the mode frondification, is the frond the same neither represents the calyptra as having a small brown covering like the calyptra of a moss, which does not exist in our plant (see Thwaites, tab. 19. f. 96). *J. pinguis* is the only other species with which *J. multigida* is likely to be confounded, and here it must be observed, that it is only allied to some of the narrowest and most branched varieties. The former, however, is always more thick and succulent, is glaucous on its upper surface, and never presents a reticulated appearance. Its stem has a much larger, and its calyptra, in every instance, free from lobes.

The three *Jungermanniae* just enumerated, being in that division of the genus, the individuals comprising which have been called *Arbores*, and differ from all the rest of that family in having no form of a stem, or perhaps, more correctly speaking, in being, altogether composed of nerve or stipe, and destitute of those lobes and more membranous expansions, which have caused all the rest of the genus to be called, in contradistinction to these *Arbores*, and which, even in one species of this very section, have a considerable approach to the appearance of the leaves in other plants. In *J. forestae* the frond has this membranous expansion continued uninterrupted from the base to the extremity, in *J. epiphylla* the margin is bare and there slightly lobed, whilst, in *J. filices* (*filices pinnatis* of Authors) the lobes are as deep, and as regular, that this species seems to hold an intermediate place between the "*Jungermanniae filices*" and the *Forestae*. That the quite membranous part of these species is analogous to the leaves in the others, will be still more apparent, when it is observed, that neither roots nor male nor female fructifications are produced (as far at least, as my experience will enable me to speak) upon it. *J. epiphylla*, in view of its stipe, may appear an exception to this remark, but even the older specimens, when held up to the light, will be seen to have an obscure though wide nerve, whence originate, on the upper surface, both the male and female fructifications, and, on the lower surface, the roots. In younger plants the nerve is very conspicuous, as it is in the immature. The situation of the spore *filices*, attached to the ends of the valves of the capsule, is, unfortunately, not confined to *J. multigida*, *J. pinnatis*, and *J. pinguis*, for they are as found in *J. forestae*, whilst, in other parts of its frondification, differs materially from these species.

The true calyx does not appear to have been noticed by any author, and, indeed, is not readily observable, except before the eversion of the calyptra, which Schmügel has mistaken for it. Neither do the Gemmæ*, figured by this author, (his *Anthera*, see his *Leaves*, t. 53. f. 8, accord in situation with those which have been communicated to me by Mr. Lyell, and which, in all the specimens, were collected together beneath an incurved extremity of the frond; whilst those of Schmügel are collected in a mass at the very apex. "Verno tempore," he says, "Martio aut Aprili, interdum jam autumnu progressu, antequam ullus calyx notabiliter excrevit, certe antequam ullus aperitur in ramulorum extremorum corniculaturam apicibus pluribus adparere solent vesiculæ minutissimæ, totæ reliquæ substantiæ pellucidiores et in flavum colorem vergentes. Hæ vesiculæ post aliquam moram fâlescere, et membranulas asuccas relinquere videntur, quæ pellicularum albarum formâ apicibus ramorum paulo inharere solent. Vero quidem non abimile videtur, in his vesiculis succo succedentem elaborari et contineri, cujus receptacula absolutâ functione flaccescunt. *Leaves* p. 215.

REFERENCES TO THE PLATE.

FIG.

1. <i>J. multifida</i> , natural size	
2. var. <i>β. sinuata</i> , natural size	
3. 4. <i>J. multifida</i> , with female fructification. natural size.	
5. Sterile plant magnified	6
6. Female plant.	5
7. Female plant.	5
8. Portion of a male frond	4
9. Anthiferous tubercle, dissected.	2
10. Anthera	1
11. Calyptra	6
12. Capsule, with its valves expanded	4
13. Calyptra, longitudinally dissected, to show the young capsule	4
14. Seeds and spiral filaments	4
15. The same	1
16. Calyx and young calyptra	4
17. Calyx torn open to exhibit the pistilla	2
18. Extremity of a gemmiferous frond	4
19. Gemmae	1

* It is possible that there are intended for the *Anthera* of *J. palmata*, which Schmügel does not appear to have been acquainted with as a distinct species; yet, to name an object so hardly to be perceived the foetus to have escaped his notice.—Meibomius, in his *Flora Germanica*, indeed, under *J. palmata*, says, "Hujus loci vix potulium species videtur *Jung multifida*, Schmügel, *Leaves*, t. 53."



Tab. 1.



fungi et plantae fungosae

JUNGERMANNIA PINGUIS.

(TAB. XLVI.)

JUNGERMANNIA, fronds oblong, decumbent, erect, carnos. sup. planiusculis, subtis tenuib., hic illic divisi, margine sinuatis fructu ex inferiore parte prope marginem egrediente, calycibus brevissimis; ore dilatato, fimbriato, calyptra exserta, oblongo-cylindracea, invol.

Jungermannia pinguis. Linn., Sp. Pl. i. p. 1609. Syst. Nat. i. p. 706. Fl. Suec. p. 405. Scop. Corn. ii. p. 251. Linn., Herb. p. 959. Schrank, Boet. ii. p. 50). Wals, Plant. Crypt. p. 107. Weber, Spicil. Fl. Goet. p. 159. Willd. Ber. p. 343. Oeder, Enum. Pl. Fl. Dan. p. 43. Villars, iv. p. 226. Roth, Germ. iii. p. 411. Hoffmann, Germ. ii. p. 91. Schumacher, Icones. p. 136 t. 35. Rell. Cent. p. 440. Hud. Angl. p. 517. Lamy, Scot. ii. p. 780. Lamour., Encycl. Bot. iii. p. 286. Witm. p. 851. Engl. Bot. iii. t. 185.

Marila media pinguis, pallidè cress, floribus majoribus nigrescentibus, ad foliorum internodiis. Michx., Nov. Gen. p. 6. t. 4. f. 2.

Lichenastrum capitulis oblongis, juxta foliorum dissepimentis emicantibus. Dill. Hanc. t. 74. f. 49. (excl. fig. a. b. c.)

Jungermannia fronde foliati, laevi, ex latere floriferi. Hall. Fl. iii. p. 63. n. 1884

β. *arborescens*, fronds elongat, subfereari, simplices vel subplanatis rariis.

HAB. Extremely moist and generally shaded places in marshes; sometimes also, though not frequently, growing under the water in shallow rivulets and stagnant pools.—It is found plentifully at Herringfleet, by Mr Turner, among Carex and other aquatic plants, in pools of water.—(The fructification, both male and female, seems to be not uncommon during most of the summer months.)

PLANT usually growing in loose and straggling patches, sometimes, however, compact and clustered.

Roots, a few minute fibres, scattered about various parts of the under side of the plant.

Some specimens I have observed to be quite destitute of them.

Fronds from one to two, and even three inches long in the var. β, procumbent and often imbricating each other, sometimes nearly erect, of an oblong figure, narrowest at the

base, where they are one or two lines in diameter, thence gradually widening to the extremity, which is rounded and obtuse, and three or four lines in width. They are either simple, or furnished with one or more large divisions or segments, (which, in every respect, resemble the principal part of the frond) and other lesser ones, which give the appearance of a serrated margin. The whole, though plane, or even a little concave above, is below so swollen, that many individuals are half an inch, or even a line in thickness, and are always destitute of any nerve. Substance cartilag. remarkably succulent, opaque. Cells numerous, small, and not readily disintegrable. Color above or less of a yellow green.

MALE FRUCTIFICATION (f. f. 4, 5, 6) situated in the superior surface of small marginal processes or receptacles, eight or ten or more of which occupy the upper half of a frond, each of these is simple or two-lobed, convex beneath (f. 5), plane above (f. f. 6, 7). In the upper and plane surface, the substance seems to be of a paler color, and more finely cellular than the rest of the plant: the anthers are so deeply imbedded, that their apex alone is level with the superficial, and is visible by means of a little opening. They are spherical, reticulated, greyish, situated upon a very short footstalk. By the shrinking up of the outside, after the discharge of the pollen from the Anthers, the apertures, which they previously filled, are now nearly empty. The receptacles themselves, in all probability, after their office is performed, expand into segments of the frond.

FEMALE FRUCTIFICATION (f. f. 1, 2, 3, 8, 10) originating in various parts of the under side of the plant, but always near the margin.

Calyx (f. f. 10, 10) nearly hemispherical, much resembling that of *J. multifida*, and having an expanded mouth and imbricated margin: its substance is cellular, like that of the frond.

Pistils (f. f. 10, 20) seven or eight in number, small, nearly ovate, with a somewhat dilated mouth, jagged and a little bent back, they are of a greyish color, marked, longitudinally and transversely, with darker lines.

Style (f. 10) three, or even four lines long when arrived at its full size, linear-oblong, cylindrical, nearly of the same thickness throughout, straight or a little waved and curved at the base, obtuse at the top, sometimes having a short style. Its texture is succulent, closely cellular. Its color a very pale greenish yellow, approaching to white.

Pedicels from two to three inches long, whitish, cellular.

Capsule oblong, red-brown marked with numerous striae or furrows, which are connected by transverse ones. It opens into four equal lacinate valves, which reach to the base of the capsule, and contain at their apices the

Spiral filaments in the form of tufts or pencils. These are formed of a simple closely-twisted helix, attenuated at each extremity, of a fulvous color, as are the seeds, which are, moreover, spherical and smooth.*

The var. *β* has a singular appearance, at first sight, from the narrowness of the fronds, and more so, when it is found branched, from the pinnated disposition of the segments. Some of the smaller individuals are not more than equal to the calyx in size.

* Schimper, however, seems to have discovered them to be otherwise. "Pis. leposum minus rugatum in totius fovea nigra, formaque spinosius, aliquidque irregularem, superficialique vix rotundis reticulatum offerebat." *Linn.* p. 129.

I have already under *J. squaripes* noticed the characters by which that species may be known from the similar variety of *J. pygmaea*, which indeed is the general outline of the head, legs, & still other characters of *J. squaripes*. The difficulty of distinguishing these two, well known enough when the greater dimensions and the two-carinated notae (the larger ocellus, more rounded appearance and curve of, the curve of the lobes are taken into consideration. The female fructification of the two species is also quite different in its structure, and affords quite distinct and more striking marks of distinction. (Following is the very well illustrated work the two in the genus has generally fallen into an error, or has not had it out, and is, where he has represented the north-western branch of *J. squaripes*, although he has, in the same place and figure, as the bottom 1 and 2, published a very convincing likeness of the true male fructification of *J. pygmaea*.

[illegible]

pro organo femineis optimo jure haberi poterunt. Neque obstatet declinata eorum flexilitas, quæ nil facile aliud nisi parietum integritatem involvet, et plantis ex merâ fibrâ valculari succrescentibus, viz. quilibet officiet. Si igitur Vascula Antheræ polliniferæ porro dici voluit, necnulli aut fructus erant sunt, aut verior usus illis assignandus est eo, quem diximus. Neque enim per glomerulos hinc, qui nunquam solvuntur, neque per contents eorum, quæ eis contabescunt, planta propagabitur, sicuti experimentis causâsime capitis supra erimus." The same author has remarked, that the *calyptra*, or, as he considered it, the *corolla*, instead of opening at the extremity for the emission of the capsule, is carried up upon it by the elongation of the peduncle. "Cum etiam corolla, ut videmus, radicata sit, Ideo interdum accidit, subeunte velocius humore aut in frondem, aut pedunculum egressum parantem, aut ubi frondis margines non satis arctè firmantur ut corolla ex parte radicans frondis solvatur et extra pedunculum, vaginæ insuper attollatur cum antem ob proodus adpressum ita impediat, ut raro notabilem altitudinem nancisci tunc possit." *Icones*. p. 139.

Dillenius has quoted doubtfully the *Hepaticoides peiustria Cichorii crispifolia*, VALLANT, Bot. Par. p. 100. t. 19. f. 4. as a synonym to the present species. The situation of the fructification, however, in that plant, and the figure of the capsule, prove that it belongs rather to *J. epiphylla*, as Schumdel suspects, and indeed that it can be considered only as a variety of it.

Upon the under side of the fronds of some of the plants which grew under water, were innumerable granules, intermixed with many oblong pellucid bodies, which are represented at f. 9. and are, in all probability, some undescribed animalcules.

REFERENCES TO THE PLATE.

FIG.		
1	<i>J. pinguis</i> , with female fructification, natural size.	
2	For β natural size.	
3	Under side of <i>J. pinguis</i> , natural size.	
4	Male plants, natural size.	
5	Under side of a male frond.	6
6	Antheriferous receptacle.	4
7	The same	3
8	Anthers	2
9	A minute animalcule, which abounds on the plant when it grows in water.	1
10	Calyptra, entire, and longitudinally dissected	3
11	Young capsule, taken from the calyptra	3
12	Full grown capsule	3
13	14. Capsules, with the calyx expanded	4
15	An old capsule, from which the filaments have fallen	3
16	Portion of the valves of a capsule	1
17	Seeds and spiral filaments	1
18	Frond, with young calyces	6
19	Portion of the same, with the calyx dissected, to show the situation of the pistilla	4
20	Pistilla.	1





Scorpaenopsis spiculifolia

JUNGERMANNIA EPIPHYLLA.

(TAB. XLVII.)

JUNGERMANNIA fronde oblongâ, submembranacea, hic illic divisa, obsolete costatâ, margine integerrimo, vel sublobato sinuatoque. Fructu e superiore parte frondum prope apicem egrediente; calycibus subcylindraceis, pilicatis, ore perim dilatato imbrico-dentato, calyptrâ cinctâ.

Jungermannia epiphylla. LIND. *Sp. Pl.* p. 1002. *Syst. Nat.* ii. p. 706. *Fl. Suec.* p. 403. LUTER, *Herb.* p. 134. POLLICH, *Palat.* iii. p. 200. SCOROLL, *Carn.* ii. p. 330. WAIS, *Plant. Crypt.* p. 106. WEBER, *Spicil. Fl. Goet.* p. 157. WILLD. *Bot.* p. 343. OERST, *Enum. Pl. Fl. Den.* p. 43. *Fl. Den.* t. 359. SCHMIDEL, *Jung. Diss.* f. 1 p. 4. HEDWIG, *Theoria.* p. 63 et seq. t. 21. 22. et 23. SCHREBER, *Spicil. Pl. Lips.* p. 110. KORTZANK, *Germ.* ii. p. 22. ROTH, *Germ.* vii. p. 410. REICHMAN, *Couv.* p. 440. KORTZ, *Aspl.* p. 617. LICHTE, *Scot.* vi. p. 783. WITT, iii. p. 840. LIND. *Syst. Nat.* ed. Gmel. ii. p. 1353. LAMARCK, *Encycl. Bot.* iii. p. 296. LAMARCK, *Pl. Fr.* ed. 2. vol. ii. p. 425. *Engl. Bot.* t. 771.

Lichenostrom capitulis rotundis, e foliorum medio emanantibus. RAB. *Syn.* p. 110. n. 3.

Murzilus major atro-virens, floribus obliquantibus, e foliorum medio egredientibus. MICHELL, *Nov. Gen. Pl.* p. 5. t. 4. f. 1.

Hepaticoides, Hepaticæ facie. VAILLANT, *Bot. Par.* p. 92. n. 1.

Lichenostrom capitulis rotundis, e foliorum medio emanantibus. DILL. *Herc.* t. 74. f. 41.

Jungermannia fronde foliacea, obtusâ lobatâ, ex medio floriferâ. HALL, *Herb.* i. i. p. 63. n. 1683.

β. **LONGIFOLIA**; frondibus elongatis, simplicibus, vel innovationibus subnatis hic illic divisis.

Jungermannia epiphylla β. *longifolia*. LAMARCK, *Encycl. Bot.* iii. p. 280. LAMARCK, *Pl. Fr.* ed. 2. n. 11. p. 426.

Jungermannia endioteafolia. DICHA. *Pl. Crypt. Fasc.* iv. p. 19.

Hepaticoides palustris Cichoriæ crispæ foliis. VAILL. *Bot. Par.* p. 100. n. 5. t. 19. f. 4.

γ. **FURCIORELLA**; frondibus apice innovationibus angustis, dichotomè divisis; ramis ultimis furcatis.

HAB. Moist bogs and shady wet places in various parts of Great Britain, most abundant.
—J. Wet ditches in Yorkshire.—In a field near the orchard, Ballysheehy near Bantry.
Miss Hatchins.—Bog between Lanth Malwood Lodge and the Ringwood road, Hampshire.
Mr. Lott.— γ Not uncommon in the autumnal and early winter months in various parts of Suffolk. In the chann at Chedder, Somersetshire, and about Torquay and Dartmouth, Devonshire.—*Miss Hatchins* finds it in Ireland, and *Mr. Lott* in the New Forest, Hampshire.—(Both male and female fructification are produced in the spring and autumn.)

PLANT growing generally in very large patches of some feet in diameter; the individuals interlocking each other, and matted together by means of their radicles.

Roots issuing from nearly the whole length of the stipe on the under side of the frond, composed of small dense simple fibres.

Fronds from one to two, and even four inches in length in the σ . β . oblong, or oblong-obovate, at the base always narrowed, simple, or once or twice divided, without any regularity, by short lateral segments, their margins waved, entire, or at most only cut into a few short and very unequal lobes, which are flat or curved at the extremity of such plants as produce young female fructification: a terminal lobe is generally kept down, so as to conceal it (*f. f. 1. 5*); variegations are sometimes produced, simple and lateral in α and β , in γ terminal, and divided in a dichotomous manner twice or thrice, with the extremities more or less forked: the whole plant has a wide, and (except when held between the eye and the light) not a very conspicuous nerve. Then, as the younger plants, is most evident, and in the anthers in the σ γ (*f. 16*), is at all times very distinct. The veins of the frond are large and coarse: the color a deep green, much darker about the nerve where a purple tinge is also not unfrequent.

Male Fructification situated in the upper surface of the frond, and always confined to the nerve, in which the anthers are imbedded, a single row beneath a small swelling or tubercle (*f. f. 1. 5. 7*), each in of a roundish figure, and a greyish color: or in a more advanced state yellow, surrounded by a pellucid limbus. As it is only in a dried specimen that I have yet had the opportunity of examining the anthers, I have been unable, satisfactorily, to distinguish the limboalk, which, in all probability, is extremely short, like that of *J. pinguis*.

Female Fructification upon the same plants with the male, as well as upon different individuals, like it, too, proceeding from the upper side of the nerve, though a swelling may be observed beneath, in the young state of it (*f. f. 1. 5*).

The calyx appears to be formed by the bursting of the frond, which takes place near the extremity, or sometimes near the middle of the plant: what appears at first but an irregular laceration in the frond (*f. 17*), afterwards becomes a tubular, and somewhat plicated calyx (*f. f. 8. 10*), varying in length from half a line to a line and a half, having its mouth a little expanded, and toothed in a very evident but irregular manner: in its color, and in the form of its calyx, it partakes, as may be supposed, of the nature of those of the frond.

Calyptra, when young and enveloping the capsule, of an ovate figure, approaching to round, tipped with a long tubular style, and bearing, on various parts of its surface, abortive pinnae, which, like the style, are tubular, a little expanded at the mouth, and irregularly toothed: throughout their whole length, they are marked with reddish lines, and have also numerous transverse striae. When it has reached its full size, the calyptra is of an

BRITISH JUNGERMANNIÆ.

(*J. epiphylla*.)

oblong shape, and in length, twice or thrice exceeds that of the calyx. Its texture is very thick, carnosæ, and closely cellulose: its color a dirty white (t. f. 11 12)

Peduncle from two to four inches long, whitish, cefinose, tipped with the almost spherical *Capsule* (f. f. 13 14 15), which is of a pale greyish-brown color, and opens into four equal cleft valves: these soon become recurved, and exhibit the

Spiral filaments, intermixed with the seeds, attached to the inner base of the capsule, in the form of a beautiful tuft or pencil (f. 15). The filaments are extremely long, much twisted, composed of a double helix, and enclosed within a pellucid, capillary tube. Their color is a pale reddish-brown: that of the seeds, which are of an irregular but more or less oblong figure, is an olive-green, inclining to yellow.

The var. *β longifolia* has the frond greatly lengthened out, so as not unfrequently to exceed three or four inches, whilst its width is scarcely more than an ordinary linn. So crowded is it in its mode of growth, that it becomes erect in some situations. It is more delicate in its texture than *α*, and has its margin more frequently turned into lobes, in the manner of which, Mr. Lyell has remarked dark marks, whence have been produced lateral and undivided innovations, about half or three quarters of an inch in length, exactly resembling the parent frond.

γ frondifera appears to be most abundant in the autumnal months, when the apices of the fronds are produced in a very remarkable manner, forming innovations, or perhaps, more properly speaking, branched elongations, which are considerably more narrow, and of a paler green than the rest of the frond, and have the ultimate branches always more or less forked. As I have already observed, the nerve is here at all times very conspicuous, disappearing only immediately below the extremities of the divisions. In the month of March, I have lately remarked, on plants of this description, that the branches became wider and of a deeper color, and that they gradually partake more of the usual appearance of the plant: roots descend from their under sides, and the old fronds seem to be going into a state of decay; so that these curious processes are, in all probability, destined by nature as a means of increasing the species, different from any that has yet been noticed in the other *Jungermanniæ*.

—

Of the present species, Vaillant was induced to consider what I have above described as the elongated variety, a distinct plant, and our countryman, Mr. Dickson, has followed him in this particular: an opinion with which I would gladly have coincided, but that, for my own part, I can neither find in the figure of the one, nor in authentic specimens from the other, any characters which will lead me to suppose them other than varieties, and I have consequently thought it best, as Linnæus has already done, to make this appearance the *β* of *epiphylla*. The crinkled habit is by no means peculiar to it, and seems only to arise from the situation in which it happened to grow, for, among small mosses since, I have observed our common *J. epiphylla* to have an equally curled or waved frond, in consequence of the unevenness of the surface to which it was attached.

Whatever similarity may exist at first sight between the various species of these British *Jungermanniæ*, which have been termed by botanists, "*frondosæ*," it is certain, that no two of

them united in the important parts of the fecundation. With regard to the individual which is the subject of the present description it is without difficulty distinguished from *J. piagula* and *J. multifida* in having a nerve, which, however obscure in some of the old specimens, may in all be seen by holding the plant between the eye and the light and may be traced on the under side of the plant by the insertion of the moss, since these are confined to the nerve itself. In this respect, indeed, it resembles *J. furcata*, *J. Blasia*, and the beautiful *J. Lyellii*, n. sp. Yet it is with the latter alone that it can be confounded, and with it only in a barren state: but this is a far more delicate plant than *epiphylla*, is furnished with a very distinct, though narrow, nerve, and has the margin beset with a few scattered teeth.

In the situation of its anthers, *J. epiphylla* differs from every known species; they being placed singly and immersed in small scattered tubercles upon the upper surface of the nerve, as has been long known by the able descriptions and illustrations, first of Schmidt, and afterwards of Hedwig. The latter author in particular has been so fortunate, as not only to have observed in this species the explosion of the farina from the anther, but to have seen the seeds germinating, and has thus been able to bring forward the strongest arguments in favor of his own system. Speaking of the little bodies imbedded in the tubercles "Antheras hic sees," he says, "dubitare nullum poteram. Quo vero sacro conformationem et structuram et distinctiorem extrinsecam, assererebam, consensu subit more, particulam sectione perpendiculari utrinque secundum longitudinem per aliquot locum punctularem ductâ. Hanc equam guttula in lamella vitreâ inserta, ut si notatu digniora adparerent, delineationi conservarem. Latus subadverso apparatus, tab. XVII. a. fig. 3. expressum cum sola tribus folliculis, massâ levissimâ granulâ ornatis. Atque en, singulare fortasse faver. Inter delineandum scuturire de illa folliculo b, per superinductum superficiel vesiculorum opus cuticula, incipit massa granulata, eundem in figuram ac ibi delinens habetur. Peristebat in eâ duorum circiter minorum intervallâ. postmodum verò anteriora versans, nimirum c. d. ejusdem figurâ inclinare incipiens, brevi distrahensque partem notu virido. Testimonio adeoque demum, contra asexualitatem, quam evidentissimo, acipulam hic dedecore sua thesauri organa."

With regard to the germination of the seeds of *J. epiphylla*, the same author remarks, "Anno 1760, mense Aprili, cum Jungermannia seminula oratis, viridibus, extremitate altâ angustiore, dilucidior, motu sui feci aliquod periculum, to testulâ terrâ repleâ alaptatâque hujâ experimento: impergebam superficiel pulvillum equabilem et felicissimo cum successu. Innumescebant ista seminula post aliquot dies, deinde a distans extremitate prodibat radice simplex, alba, pelliculosa. Reticulata primi incrementi fabrica, subinde in perfectas plantulas altâ expandebantur. Sic et de his certum constat pulverem capsularum semina esse vera, futurâ antherarum viriditate."

REFERENCES TO THE PLATE.

FIG.

1	<i>J. epiphylla</i> , with male and young female fructification, natural size.	
2	Female plant, with a young calyx, natural size	
3	Female plants, with a calyx fully formed, natural size.	
4	Female plants, with perfect capsule, natural size.	
5	No. 1 magnified	6
6	Portion of the same, containing the anthers	5
7	Transverse section of the same	3
8	Anthers	1
9	Portion of No. 3, magnified	6
10	Longitudinal section of the same.	4
11	Young calyptra	3
12	Abortive pistilla	1
13	Capsule	4
14	Capsule, about to open	3
15	Capsule, with the valves expanded, showing the insertion of the spiral filaments	4
16	Seeds and spiral filaments	1
17	Portion of a frond, with a young calyx and pistilla.	4
18	Portion of the ear, γ	5



Juniperus communis L. var.

JUNGERMANNIA DICKSONI

(TAB XLVid.)

JUNGERMANNIA, caule ascendente, subramifera. foliis hinc inde, inæqualiter sessilibus, ovatis conduplicate-
 catis inferioribus longioribus. strisque angustis ovatis subatropurpureis, nervis fructu terminali,
 calycibus ovatis plicatis uni nervato, densis.

I. a. Found many years since in Scotland by Mr Dickson. It is the same as the *Jungermannia*
Kerckhoffiana most abundant growing on rocks and especially in August. Mr Lye.—
 Maudslayi about Dublin. Mr Taylor.

Plant growing in small and densely covered tufts.

Stems a few slender whitish, simple, fibres, proceeding from near the base of the stem
 stems from a quarter of an inch to nearly half an inch in length filiform, slightly flexuose,
 at the base usually a little plicatulate, in the rest of the plant erect undivided, or
 sometimes, though rarely bearing a simple branch or ramification. The lower part of
 but of the leaves. The texture is, in the upper part tender and cellular, below more
 compact, somewhat brittle when dry.

Leaves (1, 2, 3, 4, 5, 6) more or less closely placed in a latitudinal manner, patent or subterminal
 towards the apex of the plant frequently sessile, about a quarter of a line long, deeply
 divided into two unequal imbricate lobes or segments, of which the inferior is almost
 twice the size of the superior, but both of the same figure narrowly ovate, with acute
 apices, their margins are entire or only slightly, and principally in the upper leaves,
 irregularly toothed. Their general color is a yellow-green approaching to olive, in
 shady situations of a more obscure green. The lower leaves more or less incline to a dirty
 brown. The *cellules* are small, rounded, of an oval size throughout.

(J. Dickson.)

BRITISH JUNGERMANNIE.

Perigonal leaves (f. 10) more closely placed than the rest, with which they are intermixed, and are scarcely different in figure, except in having their base swollen for the reception of the anthers.

The *Perichatist leaves* (f. 7) also much resemble the cauline ones: they are erect and embrace the lower part of the calyx with their segments.

MALE FRUCTIFICATION situated in the axille of the perigonal leaves: in each of which are placed two or three, nearly spherical, reticulated *anthers*, each supported by a white transversely striated *footstalk*, which is about equal to the anther in length.

FEMALE FRUCTIFICATION terminal.

Calyx (f. 8) half an line long ovate longitudinally plicated, the mouth a little contracted and toothed, a texture it nearly resembles that of the leaves as does the *stole* also, except that towards the mouth it becomes white, and, as it were, scarious.

Calyptra (f. f. 3. 9) small, ovate, of a delicate membranaceous texture, reticulated; *syle* short.

Peduncle two or three lines long, white, succulent, cellulose.

Capsule ovate, approaching to round, both longitudinally and transversely furrowed, and remarkable for being of a pale, and rather bright red color. The four valves are ovate, and of an equal size.

Seeds and spiral filaments (f. 9) fulvous, approaching to red: the former spherical the latter short and composed of a double half.

There are few naturalists to whom Cryptogamic Botany is more indebted than to Mr. Dickson. In the genus *Jungermannia* his numerous additions to the list of the British species are well known. The present is one of many collected since the publication of the fourth fasciculus of his *Plantae Cryptogamicæ*, in the Highland Mountains of Scotland, which he kindly communicated to me; and I have great pleasure in distinguishing it by his name. I have already noticed it under the descriptions of *J. albens* and *J. obtusifolia*, next to which it most naturally ranges, differing from both in the ovate and sharp segments of the leaves, which are quite destitute of any appearance of a nerve. The pale red color of the capsule affords a very obvious and striking mark, when the plant is in a forward state of fructification. The greater part of the annexed figure was drawn from Mr. Dickson's original specimens, but the male and female fructification have been added from others lately gathered by Mr. Lyell, who alone has found the plant in that state. I ought to remark that, in general, the individuals collected by the latter gentleman have their leaves more crowded than appears from the plate, though, in other respects, they exactly agree with Mr. Dickson's specimens, as do, in every particular, those gathered by Dr. Taylor.

REFERENCES TO THE PLATE.

FIG.

1.	<i>J. Dicksoni</i> , natural size.	
2.	The same, a barren and fertile plant, magnified	5
2 ^a	Male plant	6
3.	Calyx, longitudinally dissected	4
4.	Portion of the stem with leaves	4
5.	The same	3
6.	A single leaf, with the lobes expanded	3
7.	Perichætiol leaf	3
8.	Capsule	3
9.	Seeds and spiral filaments	1
10.	Perichætiol leaf, containing the anthers	3
11.	Anther	1
12.	Anther, after the pollen has been discharged	1





Jungermannia trimeris

JUNGERMANNIA FRANCISCI

TAB. XLIX.

Jungermannia : caulis erectiusculus, simpliciter vel ramoso foliis subterestribus, ovulis cernatis, acutis
 recurvatis stipulis minutis, acutis, latis. Fractis in ramos prostratos breviter terminati calycibus
 oblongo-cylindricis, parvis, plerumque, non deorsum.

Jungermannia luida Schmidtke *Index* p. 244. t. 62. f. 10. 30. (specimen gemmiferum), et
 p. 250. t. 64. f. 2. (planta copulata.)

HAB. Aerial Hills and Edgefield. Norfolk. *Rev. H. B. Francis*.—New Forest. *Forest*
Mr. Lyell.—Aerial Hills, and Edgefield. Norfolk. *Rev. H. B. Francis*.—New Forest. *Forest*
 places upon the ground near the Denny, Herringfleet, Suffolk. (I presume fructification
 both male and female in the spring and early summer months.)

Plant growing in moss, and rather densely crowded patches of a pale green color, or is very
 frequently, a large of purple.

Most consisting of a few minute simple fibres, which originate at various distances from the
 under side of the plant.

Stems seldom exceeding five or six lines in length, slender, glaucous or more or less
 incrassated apically, flexuose. The lower part simple usually bare of leaves, villous,
 and of a whitish color, the rest either simple, or more or twice divided with glaucous
 branches which are generally erect but occasionally procumbent of a pale yellowish
 green color, more and then tinged with purple at their extremities.

Leaves (f. l. & c.) small in proportion to the diameter of the stem, growing in a distant
 manner, alternate more or less closely placed, usually a little imbricated, either erect or
 erect-patent, about the width of a line in length, ovate, imbricate from the apex notched
 for about one fourth of their length, and two equal, and wider at about the middle.
 The substance is, for so small a plant, suberose the stipules minute, the color a
 pale green, inclining to purple in those leaves which are more exposed to the light and air.

* Mr. Lyell discovered a single specimen with a larger solitary radicle, much resembling that of *J. thyrsifera*.

Perigonal leaves (f. 9) no otherwise different from the rest, than in being more condense and more closely appressed or imbricated one over another, so that the extremities of the branches, where they are found, are incriminated, which renders them the more readily discoverable.

Perichætal leaves (f. f. 3. 9. 10. 11) seven or eight in number, increasing in size from the base of the fruit-bearing ramulus, where they scarcely exceed the common cauline leaves, to the insertion of the calyx, where they are twice or thrice their length, imbricated on every side, their figure oblong, approaching to quadrate, concave, or, perhaps, more correctly speaking, semicylindrical (f. f. 9. 10); at the apex, they have a deep and wide notch, of which the segments are acute and not unfrequently denticulated, wavy, or even recurved.

Stipules (f. f. 7. 8) small, scarcely more than one third of the size of the leaf, plane, and either appressed, or projecting a little from the stem: their form is ovate, and they are divided at the extremity by an acute sinus into two rather sharp segments, which in length are about equal to one third of that of the stipule.

Male Fructification now situated in the axillæ of the perigonal leaves. *Anthære* (f. 16) generally found singly, sometimes two together, nearly spherical, of a pale greenish ash color, in a young state faintly, at an advanced period more evidently, marked with reticulations. The *footstalk* white, semipellucid, transversely striated.

Female Fructification terminal upon the proper footstalks.

Calyx (f. 12) nearly half a line in length, oblong, a little attenuated at the base, and slightly narrowed upward, where it is longitudinally plicated: the *vein* small, and evidently toothed. In texture it resembles the leaves, as it does in color, though it is often of a paler tint.

Calyptre (f. 13) ovate, whitish, delicate, furnished with a short *style*. It opens with a vertical fissure for the emission of the capsule: its base is surrounded by a few barren *plumulae*.

Pedicels about four lines long, white, cellular.

Capule (f. 14) small, ovate, brown, splitting into four, equal, ovate valves.

Seeds and spiral filaments (f. 15) fulvous: the former spherical: the latter formed of a double helix, rather closely twisted.

Gemmae (f. 4) are found at the same season of the year with the male and female fructification: the *stipules*, at the naked apex of which they are produced, have their leaves smaller and more distantly placed, as well as more erect and appressed, than is usual with the fructiferous individuals. They are collected in minute, rather compact spherical masses, so that, in this respect, as well as in their situation, they resemble those of *J. bleuspidata* and *J. Trichomanis*. Each particle is pellucid, of a greenish color, and angular (f. 17).

Under my description of *J. byaracæ*, (Tab. xii.) I first noticed this plant, which I had some reason to think might be the same as that which is figured by Schmidel, in his *Icones*, t. 62. 90. f. 2. and t. 64. f. 9. But these representations are too imperfect to enable me to decide with any degree of certainty, and the important distinguishing character, the blind stipule, seems to have no existence there. I have, therefore, considered it best to quote the Schmidellian plant with a mark of doubt, and I gladly take the opportunity of distinguishing the present by the name of its discoverer, my friend, the Rev. R. B. Francis, who has so successfully investigated the vicinity of his own residence in search of the plants of this genus, and has so kindly and liberally communicated to me numerous specimens, and much valuable information respecting them.

In habit *J. Francisæ* certainly approaches *J. byaracæ*, as well as small varieties of *J. baccinifolia*; but the upright growth of the caudex, and the more concave and less deeply notched leaves are of themselves sufficient marks of discrimination, and when the presence of the stipules is taken into consideration no difficulty in distinguishing them will be found to occur.

With regard to the stipulated species, among which it ranks, I am unable to mention any to which it bears such a similarity as to render it necessary for me here to notice the points in which they differ.

REFERENCES TO THE PLATE.

FIG.

1. <i>J. Francisæ</i> , natural size.	
2. Male plant, magnified.	6
3. Female plant.	6
4. Gemmiferous plant.	6
5. Barren plant.	6
6. Portion of the stem.	4
7. View of the under side of the stem.	4
8. Stipule.	3
9. 10. 11. Perichætiæ leaves.	3
12. Calyx.	3
13. Calyptra.	3
14. Capsule.	3
15. Seeds and epipal filaments.	1
16. Anthers.	1
17. Gynæceum.	1





Jampermenesia decipiens

JUNGERMANNIA DECIPIENS.

(TAB. L.)

JUNGERMANNIA, surculo erecto, flexuoso, subsimplici. *Folia* inferioribus minoribus, ovatis, integerrimis superioribus rotundato-ovatis, sæpius subquadratis, dentibus apice ætate, sparsis, spiniformi.

HAB. Rocks on heathy places about Bantry. *Mrs. Hatchins.*

PLANT growing in dense tufts of small size.

Root large, creeping, of a ligneous texture and brown color, throwing out here and there small opaque fibres.

Stems erect, filiform, flexuose, from half an inch to an inch and a half in height, and about the thickness of horse-hair, simple or rarely divided at the base. sometimes, however, two or more arise from the creeping root. they are of a rigid and somewhat brittle texture, below of a dark brown color, and opaque; above of an olive-green, and evidently cellular.

Leaves alternately and rather distantly disposed in a bifarious manner. those at the base smallest, most widely placed, not more than a quarter of a line long, ovate and concave, with entire margins, and either appressed to the stem or erecto-patent. the rest are considerably larger, though they frequently again diminish in size as they approach the extremity. and are of a roundish or even a subquadrate figure. patent, and sometimes recurved, as in *J. spinulosa* and *J. spletioides*, their base is decurrent, their margins furnished with one, or often two or three large, and, at their base, broad, spiniform teeth, but these are placed in so irregular a manner, and at such uncertain distances, that it is not possible to find two that precisely agree in this particular. A common appearance of the lower leaves is given at *f* 10. *f* 4 is a portion of the stem, of which one leaf has two, and the other three, teeth at the apex. *f* 5 has an acute tooth at the extremity and another lateral one. *f* 6 represents two leaves, the one having its margins entire, the other furnished with an obtuse. lateral tooth, which is not of common occurrence. *f* 7 has two divaricating teeth at the apex. *f* 8 is cut into two unequal limbs, (which may probably have been the effect of accident) the one having two terminal teeth. the other,

(*J. decipiens*.)

BRITISH JUNGERMANNIÆ.

one terminal, and a minute lateral one; whilst, at *J. D.*, an ovate leaf is tipped with a single tooth. The texture of the leaves is somewhat rigid, and, like the stem, when dry, of a brittle nature. The cells are of a rounded figure, except at the margin, where their larger and more quadrate shape forms an evident border to the leaf.

No fructification has hitherto been discovered upon the present species by the indefatigable lady to whom we are solely indebted for our knowledge of it: a circumstance that is the less to be regretted, since there are sufficient characters in the foliage to distinguish it both from *J. asplenoides* and *J. spinulosa*, its nearest affinities. Nor does it, however mutable in the shape of its leaves, appear to be subject to any variation of a nature to cause it to be confounded with others, for Miss Hutchins remarks, "I have watched it very attentively for three years past, and could not observe any alteration. I at first thought it might be a variety of *J. spinulosa*, but now I am pretty sure it is distinct."

REFERENCES TO THE PLATE

FIG.

- | | | | |
|-------|---|----|---------|
| 1 | <i>J. decipiens</i> , natural size. | | |
| 2 | The same, magnified | .. | .. 6 |
| 3 | Portion of the stem | + | .. 4 |
| 4—11. | Various figures of leaves from the same individual. | . | 4 and 3 |





Juniperus horizontalis

JUNGERMANNIA HAMATIFOLIA.

(TAB. LI.)

JUNGERMANNIA a musculo serpente, filiformis. Sexuata, vagit ramosa; foliis distichis, latis. Indes inaequalibus, superioribus majoribus, ovatis acuminatis, apice serrulatis, nervis inferioribus involutis stipulis ovatis, acutis bifidis fructu laterali, calycibus obovatis, pentagonis, nec cupulatis, octavo, septato.

♂ DEN DATA foliis elegantissimis obtusis.

HAB. Rocks upon Ingleborough, Yorkshire and in the Den of Rarlup, near Duplaxid.—
Anna. Bunter upon the summit of *Old man*, and in other situations in that neighbourhood, frequently intermixed with *J. calypso folia* *Mus. Hartmanni*.—*Dr. Eger* also found it growing with the same species near *Kennich*. *Lindbergh*—its localities in the country of *Acety*. *Dr. Turpin*—it was discovered upon the banks of *river* in *Tutary*. *Dr. Turpin*—it was likewise seen found in *Woodlands*, near *Dublin*. *Dr. Turpin*—its fructification, with male and female, is produced in the early spring months.

PLANT growing in small, crowded, green patches, appearing to the naked eye like clusters of minute grasses.

Roots very small, whitish fibres, distinctly scattered as in *J. arquipagula* along the under side of the stem, not subsequently issuing in little branches from near the base of the stipules.

Stipules from two or three lines to half an inch in length, extremely slender filiform. *Hyaline*, transparent, rising over each other in an imbricated manner, or overlapping in a decussated form. Each individual is regularly once or twice divided in a subdistichotomous manner. The segments very long much in their length, as well as in their direction. The *tertiary* is delicate, composed of shining yellow. The *quaternary* a pale green.

Leaves 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

of a line in length, very convex on its superior surface, of an ovate figure, acuminate at the extremity, where it is often curved in various directions, but usually downward: the margins are either entire (f. 5), or serrated (f. f. 4-7), a circumstance that varies much in different individuals, and even on the same shoot, though the former appearance is the most common: the lower lobe is about half the size of the upper, which it resembles in shape, and is remarkably acuminate, having its margins crenellated, though rarely, very slightly serrated. The *reticulation* of the leaves is rather thick and subcurrent for so small a plant, the *cellules* small, round, a little prominent. The *vein* pale green.

Perigonal leaves generally to be found at the extremity of a *caeculus*, scarcely differing from the rest except in being ventricose at their base, and placed in a more crowded and somewhat imbricated manner.

Perichætal leaves (f. f. 2-4, 8, 10) almost twice the size of the *cauline ones*, two attached to each *calyx*, the base of which they embrace. They are ovate, approaching to round, nearly plane, divided, for about one half of their length, into two, ovate, but unequal, upright, acute segments or lobes, of which the margins are sometimes entire, but more frequently elegantly and very conspicuously serrated (f. f. 8, 10.)

Stipulae (f. f. 7-8) small, ovate, acutely cleft for nearly half their length into two sharp, equal segments, which appear to be always entire at their margins.

MALE FRUCTIFICATION a single spherical *strobilus*, situated in the axilla of each perigonal leaf; it is finely reticulated, of a pale yellowish ash color: the *footstalk* is white, pedicel, and transversely striated.

FEMALE FRUCTIFICATION lateral.

Calyx more than a quarter of a line long, ovate or obovate, often attenuated at the base, distinctly ribbed with five prominent and acute angles, reaching from the extremity nearly to the base, these are either entire (as at f. 10) or strongly serrated (as at f. 3). The mouth is much contracted, and generally also elevated and tubular, cut into many fine and sharp teeth.

Germen (f. 11) ovate, contracted at the base, style rather long, tubular.

Clatypus (f. 12) ovate, whitish, reticulated.

Peduncle scarcely exceeding the length of the *calyx* more than half a line, divided, by means of transverse septa, into short joints, which again appear striated longitudinally, in consequence of the numerous narrow, and tubular *cellules* of which they are composed.

Caputis exactly spherical, white, pedicel, membranous, reticulated, opening into four equal segments or valves, which are only half as long as the capsule, and at their apices support the

Spiral filaments, adhering to them by their bases: each composed of a double helix, slightly twisted, and enclosed in a pellucid tubular membrane. The *seeds*, though by no means exactly spherical, are more so than those of *J. culpestrifolia* and *J. serpyllifolia*, and are of a green color, inclining to olive.

The leaves of our *β* present under the microscope a highly-beautiful and singular appearance, for each *cellule* upon their surface and margin, which in the common state of the plant is, at most, convex or slightly prominent, is here so much ex- and so acuminate as to appear altogether echinulated: a peculiarity that is not confined to the *cauline leaves*, but extends to the *perichætal ones*, and to the *calyx*. The *cellules* of the stems, too, are more than usually convex.

BRITISH JUNGERMANNIE

(*J. Acutifolia*.)

(The same minute, nearly spherical, reticulated bodies (f. 13), which, under the description of *J. caespitiformis*, I have called *gleume*, are also abundant upon the present species, but I was unable to discover how they are attached to it.)

In my remarks on *J. caespitiformis*, I have noticed the affinity which the present plant bears to the var. β of that species, and, in addition to the observations I there offered, I have only to add that this is much smaller in all its parts; that the size of the lobule, both in the cauline and perichætal leaves, bears a much greater proportion to that of the lobes; that the testate is thicker and more succulent, the calyx narrower, and the stipules more ovate.

J. Acutifolia is probably not a rare inhabitant of the subalpine parts of the British Isles, but an experienced botanist, without the assistance of a microscope, would scarcely be able to distinguish it, in its native place of growth, from *J. minutissima*, although on a more minute examination, the leaves will be found to possess a widely different character.

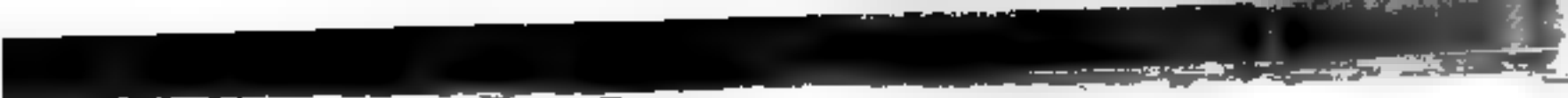
I have to regret that the Anthers, and a more perfect state of the capsule, as well as the var. β , were discovered too late to have them inserted in the annexed plate.

A minute, reddish, globular body (f. 8) is not unfrequent in the axillæ of the leaves, and may at first sight be readily mistaken for an Anther; but it is pellucid, always destitute of a footstalk, and has rather the appearance of an animal than a vegetable substance.

REFERENCES TO THE PLATE.

FIG.

1	<i>J. Acutifolia</i> , natural size.	
2	Portion of the same, magnified	6
3	Enlarged portion of the stem	4
4	The same, with serrated leaves	3
5	Cauline leaves	3
6	Cauline leaf, with an animalcule (?) in its axilla	3
7	Under side of a portion of the stem, showing the stipules	6
8	Stipule	4
9	Perichætal leaves	4
10	Calyx and perichætal leaves	4
11	Germs	9
12	Capsule	1
13	Gleume	1
14	Spore	1





Juniperus communis

JUNGERMANNIA MINUTISSIMA.

(TAB. LII.)

JUNGERMANNIA, caule repente, efformi, flexuoso, vagè ramoso foliis distichis, ovato-rotundatis, apice valde convexis, hinc illic lateraliter submarginatis, vix bilobis stipulis ovato-rotundatis, bilobis fructu laterali; calycibus obovato-rotundatis, pentagonis; ore contracto, pariter dentato.

Jungermannia minutissima. Engl. Bot. t. 1633

Jungermannia omnium minima, seu vix conspicua, Serpylli aut Herniariae foliis ovatis, floribus ex albo viridantibus, vaginâ cordiformi. MICHELLI, Nos. Gen. p. 2 t. 6. f. 20.

Lichnosentrum, quod Jungermannia omnium minima, seu vix conspicua, Serpylli aut Herniariae foliis ovatis, floribus ex albo viridantibus, vaginâ cordiformi. DILL. Musc. 1. 79. f. 20.

HAB. First discovered in this country by Mr Lyell, growing on the bark of holly and ash trees, near the ground, in the New Forest; bearing fruit in April and May afterwards found by the same gentleman more plentifully near Kewick, Cumberland, and upon the trees at Mount Edgecombe, Devonshire—Upon trees at Henfield, Sussex. Mr William Forster.—In the neighbourhood of Bantry, Ireland. Miss Hatchins.—It grows indifferently upon trees and rocks, and is very common in various parts both of Devonshire and Cornwall.—About the lake of Killarney, Ireland, upon the trunks of trees. Sir Thomas Gage. Berl.—Woodlands near Dublin.—Dr Taylor

PLANT growing in patches, from one to two or three inches in diameter, appearing, at a little distance, like a green stain, and, even on a nearer approach, it may readily be mistaken for *Lepraria elvella*.

The roots proceed from the under side of the stems and branches, generally immediately at the base of the stipules, and in small, whitish bundles of fibres.

Stems creeping over each other in an imbricated manner, each individual is from one to two or three lines long, remarkably slender, filiform, branched, with the branches varying in length and direction, simple or again divided. The texture is equally delicate with that of the leaves, composed of distinct, oblong cellules.

Leaves about the twentieth of a line in length, distantly placed, bifarious, alternate with regard to the stem, patent or erecto-patent, of a rosmarin-ovate figure, on the upper surface very convex, so as to be almost hemispherical, the margin is frequently altogether entire, sometimes furnished in the lower part with a small, oblique and obtuse notch, which can scarcely be said to constitute an unequally two-lobed leaf, the rest of the margin is wholly free from serratures or incisions of any kind. The color is a pale green, the texture thick and succulent, the cellular small, roundish, and a little prominent.

Perigonal leaves placed at the extremity of a branch eight or ten in number, more closely placed than the cauline leaves, but in no other respect do I perceive that they differ from them.

Perichætal leaves (f. f. 2-4) the tenth of a line long, one pair originate at the base of the calyx to which they are appressed, their figure is widely ovate, concave, divided by a very obtuse and oblique sinus, into two small, unequal, blunt lobes (f. 4).

Stipules (f. 3) small, ovate, approaching to round, furnished at the apex with a deep and sharp notch, forming two equal, acute segments.

The MALE FRUCTIFICATION I have but lately seen as in *J. hamatifolia*, a single, spherical, reticulated. Another is found in each perigonal leaf, the footstalk is short, white, transversely striated.

Female FRUCTIFICATION lateral.

Calyx (f. 2) large in proportion to the size of the plant, and thrice the size of the leaf, obovate, inclining to round, its base slightly attenuated, five acute, projecting angles extend from the apex to the base, and these are always entire the mouth is considerably contracted, and slightly trothed. In color and texture the calyx exactly resembles the leaves.

Germen (f. 5) ovate, green style rather long, tubular.

Calyptra (f. 6) ovate, whitish, membranous, reticulated.

Peduncle but little exceeding the calyx in length, white, cellulose, transversely striated, forming nearly quadrate joints, which are again striated longitudinally. Here, too, as in *J. serpyllifolia* and its associates, the peduncle, when dry, is bent at the joints in a zigzag manner.

Capsule (f. 7) precisely spherical, pellucid, white, reticulated, opening into four, equal, acute valves, which are only one half of the length of the capsule (f. 8).

The spiral filaments (f. f. 9, 11) are of a brownish color, formed of a double helix loosely twisted enclosed within an extremely delicate tube, and attached by their base to the points of the valves in small pencil-shaped tufts.

The seeds are large, oblong, somewhat angular, of a dark green color.

Germe (f. 12) spherical, green, reticulated.



BRITISH JUNGERMANNIÆ.

(J. minutissima.)

Michell had the honor of first detecting and describing this most diminutive species of the genus, which Dr. Smith has very aptly named *minutissima*. Italy and Great Britain are the only countries yet known to possess it; though, with us, I think it can hardly be reckoned among the *plantæ rarioræ*.

In habit, as well as in the more important parts of fructification, (which are such as to furnish characters for a distinct genus) *J. minutissima* precisely accords with *J. serpyllifolia*, *J. calyptrifolia*, and *J. acrostifolia*: the leaves, nevertheless, will be found to differ essentially from those of the individuals now mentioned, in being altogether entire, or at most having an obscure an incision, that no one would consider the plant as belonging to the division "*foliis inæqualiter bilobis*." Indeed, it seems to hold an intermediate place between that section and the one "*foliis integris*."

The stipules, though, on account of their small size, they are with difficulty detected and have not been noticed by any preceding authors, will, if caution is used, be found to exist throughout the whole length of the lower part of the strobilus.

Dillenius figure and description of this species, as well as those of *J. serpyllifolia*, are, as noticed by that author, copied from Michell.

REFERENCES TO THE PLATE.

FIG.

1	<i>J. minutissima</i> , natural size.	
2	Portion of a fructified stem.	6
3	Under-side of a portion of the stem, with a stipule.	4
4	Perichæcial leaves.	4
5	Germen.	3
6	Style.	1
7	Capsule bursting.	3
8	Seeds.	1
9	Capsule with the seeds discharged.	2
10	Calyptra.	2
11	Spiral filaments.	1
12	Gemma.	1

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Sargassum muticum Hooker

JUNGERMANNIA MACKAI

(TAB. LIII.)

JUNGERMANNIA, musculo repente, vage ramoso: foliis distichis, imbricatis, bilobis; lobis inæqualibus, superioribus majoribus, rotundatis; inferioribus minoribus, involutis stipulis magnis, rotundatis, obcordatis fructu laterali terminalique; calycibus obcordatis, depressis, triangularibus; ore contracto, elevato, dentato.

HAB. Sent to me, January, 1812. by Mr. Mackay, who observed that he had known the plant to grow at the Dorgie, for several years, and that it is not unfrequently mixed with *J. verpyllifera*.—On wood, stones, and stems of heath, about Ballylicky, near Bantry Miss Hutchins.—Lowdore. Mr. Lysell.—Upon rocks at Cheddar, Somersetshire, plentiful, and on the rocky sides of the chasms and vallies in the neighborhood of Torquay; and, indeed, in similar situations throughout the Lame-stone country, in that part of Devon. It occurs more rarely upon schistus, near the water-fall at the Devil's Bridge, Lidford.—Mr. Lysell finds it at Mount Edgcombe.—Sometimes it is attached to trees. (In February and March, the fruct, both male and female, is produced in Devonshire.—In Ireland, Miss Hutchins finds capsules in November.)

PLANT growing in dense, blackish-green patches of various dimensions, from one or two inches to as many feet in diameter.

Roots issuing from the lower surface of the stem, and immediately below the stipules, in small bundles, which consist of short, peltoid, fibres.

Stems creeping over each other in successive layers, and closely appressed to the surface upon which they grow each individual is from half an inch to an inch and a half in length, slender, filiform, flexuous, once or twice branched in an irregular, though somewhat pinnated, manner, the branches very variable in length the substance is rather opaque; the cellular sufficiently apparent, the color a dirty green, approaching to brown.

Leaves rather closely imbricated in two rows over the whole upper surface of the stem, horizontal, divided into two very unequally-sized lobes, of which the largest is about four tenths of a line in length, smaller as they approach the apex of the barren stem, though the reverse is the case in the fertile ones, of a roundish figure, slightly convex above, the lesser one is scarcely one tenth of its size, involute, and ventricose (f. 4) the texture is somewhat firm, the reticulation (as in the calyx represented at fig. 2) formed by

resplend. areolæ or reticulæ, and so regular in size, as to give the leaf an extremely beautiful appearance under the microscope. When dry, the whole surface appears to be elegantly punctured, in consequence of the sinking in of the centre of the reticulæ, and, when saturated afresh, a dark spot may be seen in each reticulæ, where the coloring matter has been precipitated. The general color of the leaves is an olive-green, more or less dark, frequently approaching to black.

Perigonal leaves (f. 5) more crowded and closely indurated than the rest, and the lower lobe is of a somewhat larger size, in which particulars alone they differ.

Perichætal leaves (f. 6) also bear a close resemblance to the rest, even, but they are somewhat larger, and are furnished with a lobule nearly equal to one half of the size of the lobe, the latter is appressed to the superior, as the former is to the inferior, surface, of the calyx.

Sepals large, roundish, entire, or even frequently very obtusely notched, when they may truly be called *obcordate*.

MALE FRUCTIFICATION (f. 5)

Anthere (of which one or two are situated in the axilla of each perigonal leaf) ovate in a younger state, spherical when advanced to their full size, pale grey, reticulated, footstalk about half of the length of the Anther, white, transversely striated.

FEMALE FRUCTIFICATION very generally terminal, occasionally lateral.

Calyx (f. 9) about three-fourths of a line long, *obcordate*, much depressed, especially towards the extremity, besides the two angles on the sides, a third and more obtuse one projects from the under surface, and extends from the base to the apex (f. 8). The ovary, in an early state, appears to be confined to a narrow central tubular apicalium, which may at length be distinctly seen to divide into four acute teeth, and, after the emission of the capsule, a long but narrow opening is to be observed, reaching nearly the whole width of the calyx, (f. 9) In color and texture, I can perceive no difference between it and the leaves.

Germs (f. 7) *obovate*, pale green, having a long tubular style.

Calyptra of the same form with the Germs, of a very thin membranous texture, diaphanous, reticulated. It opens with an irregular vertical fissure for the emission of the capsule.

Peduncle very little indeed exceeding the length of the calyx, sometimes not at all, white, calcareous, cylindrical, a little thickened towards the summit.

Capsule (f. 9) small, exactly spherical, of a delicate texture, less so indeed than that of *J. serpyllifolia*, but more so than that of *J. filatula* and *Tamarix*; whitish, or pellucid, but a sort of tinge of a greenish-brown color is imparted by the seeds within; marked with reticulations. The four ovate valves are equal in size, and the divisions extend to the thickened apex of the peduncle, after the discharge of the seeds they become recurved.

Seeds of an irregular form, but approaching to spherical, smooth, of a dark olive-green color. The *apical filaments* are brown, formed of a double helix, enclosed within a pellucid, tubular membrane, which at the mouth is a little expanded, at the base affixed to the extremity of the inside of the valves, where they are persistent in small tufts, even after the discharge of the seeds.

It is to my friend, Mr. J. T. Mackay, of the Botanic garden, Dublin, that we owe our first knowledge of this plant, and to him I am anxious to dedicate it. Since this discovery, indeed, it has been found elsewhere in Ireland, as well as in England, and, in the south-western part of our island, appears to be an abundant species on shaded and moist limestone rocks. In the numerous chasms in the ground, especially near the sea, about Torquay and Babbacombe, in Devonshire, *J. Mackii* grows in such profusion, as to form a striking feature in the coloring of the perpendicular faces of the rocks: though it is in more exposed situations only that the delicate capsules are to be found, and, even there, not without an accurate examination, on account of their small size.

The present species, although abundantly distinct, as well from *J. dilatata* as *J. serpyllifolia*, has, nevertheless, many characters in common with each. The former it approaches in general habit (though, perhaps, it has a still greater affinity in external appearance with *J. complanata*), and in the figure of the calyx; but it differs materially in the conformation of the lesser lobe of the leaf, in the white and delicate texture of the capsule, in the irregularly shaped greenish seeds, and in the double spiral filaments:—in all these particulars, and in the shape of the stipules, it so nearly accords with the latter (*J. serpyllifolia*), that a similarity in the shape of the calyx might not unreasonably be expected. But this is far from being the case; for, in *J. Mackii*, the calyx is depressed and has three angles, whilst, in *J. serpyllifolia*, it is by no means flattened and is furnished with five angles. This affords a character the most decisive in enabling us to distinguish the two plants, which may be further known, even upon a more casual inspection, by the much greater size, deeper, almost blackish-green, as well as the closer texture of the one (*J. Mackii*), when contrasted with the minuter foliage, more cellulose structure, and very pale green of the other (*J. serpyllifolia*).

These peculiarities of the last mentioned plant are dwelt upon by Dr. Wahlenberg, in his admirable *Flora Lapponea* (a copy of which I have but lately had the opportunity of seeing), under his *J. carifolia*; and it is from his having so done, rather than from his figure (in which no fructification is represented), or from his specific character, that I am induced to believe it to be the same as our *J. serpyllifolia*; for both will accord equally well with *J. Mackii*, as with that species. "Colore," he says, when speaking of *J. carifolia*, "*hirsutius et habitu J. complanata* L. convenit, et seminibus tripliciter angustioribus sunt fere in sequenti (*J. trichomanes*) specie. Mollis est, et a reticulato grandiori lacta."

REFERENCES TO THE PLATE.

FIG.

1. <i>J. Mackenzii</i> , natural size.	
2. Female plant, magnified	4
3. Male plant	5
4. Leaf and stipule, with a portion of the stem and roots	3
5. Perigynial leaves	3
6. Fertile extremity of a branch, showing the under side of the calyx and perichætal leaves.	3
7. Germin	2
8. Calyptra	3
9. Calyx, with a capsule after the discharge of the seeds.	9
10. Spiral filaments, enclosed within their pellucid tube	1
11. Seeds	1





Jungermannia Höckeri H. L.

JUNGERMANNIA HOOKERI.

(TAB. LIV.)

Jungermannia, caule erecto, suberecto foliis undique imbricatis, ovatis vel oblongo-ovatis, hinc illuc lobatis angulatisve fructu terminali, calyce nullo, calyptra magna, oblonga, carnosâ, laevi.

J. Hookeri. Engl. Bot. t. 9558.

HAB. Growing, intermixed with *J. multifida*, by the side of a ditch, near the private road from Cadgum to Footings, in the New Forest. *Mr Lyell*.—Stems found by the same gentleman, in August, 1813, in the moss of Kinnordy, Kermuir, Scotland.—It produces fructification, both male and female, in the winter and spring months.

PLANT growing in small and scattered patches, generally of a dull green color.

Roots: from a descending main branch (if I may so express myself), which appears to be altogether a continuation of the stem, and nearly equals it in thickness, arise several large suberect fibres, which shoot out in a horizontal direction: they vary much in length, generally exceeding a quarter of an inch, and are either simple or branched: their color is a dirty white, and the cellular structure is the same as that exhibited by the stem.

Stems varying from one line to half an inch, rarely more, in length, erect, slightly flexuose, filiform, but not remarkably slender, for the most part simple, though a divided stem is now and then observable, and a young shoot or innovation occasionally arises from various parts of the plant. The color is greenish, the texture closely cellulose.

The leaves in the taller individuals are rather distantly placed, more crowded in the shorter ones: all of them are patent or erecto-patent, sometimes a little recurved. They are imbricated without order on every side of the stem, and vary in regard to size in all parts of it, and equally so in figure: a few are rounded in their shape, but the greater number are either ovate or oblongo-ovate, or, occasionally, ligulate, plane, cut at the margin, though not deeply, yet in a manner so irregular that they they will be more easily understood by a reference to the annexed plate, than by any description I am able to give. I may observe, however, that, near the extremity of a leaf, two opposite lateral notches

are frequently seen, which then form a large terminal lobe and that, in other leaves, are formed smaller lobes or projections, as well acute as obtuse, which give to the margins a very jagged appearance. The substance is rather thin, and delicate, yet of such a nature as to dry very badly, shrinking considerably, and requiring a good length of time to recover after immersion in water. The lobules are moderately large, ovate, the color green, varying from a pale to a deeper hue.

The perigonal leaves are generally larger than the rest, and equally variable in figure with them, always situated at the extremity of the stem, by no means closely imbricated, nor have they the base (as is usual in the genus) particularly ventricose, nor the apex incurved, but rather expanded so that the Anthers are always exposed.

Perigonal leaves six or seven in number, and, as far as I have yet had the opportunity of observing, while enclosing the Germen, closely placed and imbricated, as to form a cone (f. 8), in this state too, their figure is very nearly oblongo-ovate, without any marginal lacination or projection, concave. In a more advanced state of the fructification, they are not to be distinguished, except by their situation, from the anther leaves, which they moreover exactly resemble in color and texture.

MALE FERTILIZATION in the middle of the perigonal leaves, where the

Anthers are placed in clusters of five or six together each is nearly spherical, slightly reticulated, of a yellowish color, inclining to orange, when arrived at its full size. The filament is short and cellular.

FEMALE FERTILIZATION terminal upon the stem or branches.

Calyx none.

Germen (f. 9) obovate, green, tipped with a tubular style, and surrounded at the base by a few abortive peristyle, which are linear, or only slightly swollen at the base, and at the apex, under a high magnifying power, are seen to have an expanded and hollow mouth.

Calyx none exposed, so as to resemble, at first sight, a calyx, as the main branch of the root below, so does this at the upper extremity, appear to be a continuation of the stem (f. f. 7 & 8). It is of an oblong or lanceolate figure, at the extremity, however, it is generally a little incrassated, its base is of the same diameter as the stem, with which it likewise accords in its thick texture, as well as in color, only that it is somewhat paler. The style, or the rudiment of it, is at all times apparent, and just within the perigonal leaves, even during the state of the ripe capsule, a few of the stamens may be seen. At the apex, the calyx opens with a vertical, but irregular fissure, for the exit of the capsule.

Stamens about half an inch in length, white, filiform, monosperm, terminated by the

capsule, this is of a barrel-shaped figure, pale brown color, and reticulated structure, rather dense, subglobose. It opens, for the most part, into four equal linear valves, which often cohere at the extremity, in consequence, as it appears to me, of the entanglement of the filaments. Sometimes five valves are seen and more than once Mr. Lyell has observed an appearance of only two valves, and these were held together at their apex, as to form the same figure of the periphery of an ellipse.

Seeds (f. 10) disposed within the capsule in threes, and enveloped in a transparent pellicle, through which they are distinctly seen, in an immature state, to be of a green color, when more advanced (f. 11) they become brown, and the pellucid covering is not apparent, though they very generally hang together (if I may so express myself) in threes.

BRITISH JUNGERMANNIÆ.

(J. Hookeri.)

Like the seeds, the spiral filaments are in a young state green, and enclosed in a thin white membrane (f. 18), which in their perfect state is lost. They are formed of a single helix, attenuated at each extremity, and, as in most of the freshwater species, are attached to the extremity of the valves in pencil-shaped tufts.

Perhaps, there is not to be found, in the whole genus of *Jungermannia*, a species more decidedly marked, both in its fructification and its foliage, than that represented on the annexed plate. It is one of the many interesting discoveries made by Mr. Lyell, who kindly proposed that it should bear the name under which it has been already described in *English Botany*.

The most remarkable feature in this plant, (if I may be allowed such an expression, where every thing is so strange,) is the absence of a calyx, and the prominent fleshy calyptra, which, by a casual observer, might be taken for a calyx. The horizontal, thick, and fleshy fibres of the root, seem rather to belong to some phænogamous plant, than to the genus *Jungermannia*, almost all the species of which are furnished with remarkably slender, simple, and descending radicles. The multifarious insertion of the leaves is of rare occurrence in the present tribe of plants. Indeed, I am only acquainted with two species of British origin which have this peculiarity in common with it, *J. minima* and *trichophylla*, but in every other respect these plants are widely different; the individuals now mentioned having setaceous leaves while those of *J. Hookeri* are broad and subovate, or sagulate, varying most remarkably in size, and in the shape and situation of the lobes and crenatures, with which the margin is generally furnished. Most of the *Jungermannia* are well known to possess the property of being easily restored to a fresh and vigorous appearance, after being dried for a considerable length of time; but the present species is a striking exception even to this rule, since, after ever so long an immersion in water, it very imperfectly recovers its original state.

In the color of the Anthers, and in their exposed situation, a similarity may be traced between them and the Anthers of *J. pusilla*. But the female fructification is totally different, and, in the form of the capsule and the situation of the spiral filaments, there is a close analogy with *J. pinguis* and *multifida*, between which, and the *Jungermannia foliosa*, *J. Hookeri* may be considered as holding the middle rank. The covering of the apices of the valves of the capsule, which Mr. Lyell has remarked to be an equally common occurrence in the specimens he finds at Kilmorby, as in those from the New Forest, is not confined to this species. It also happens with the capsule of *J. Lyellii*. But in no other individual have I yet observed the seeds to be disengaged in threes, within a pellucid covering (though, it is not impossible that such a circumstance may have escaped my notice, through neglect of examining the capsules in an immature state, when this appearance is most evident).

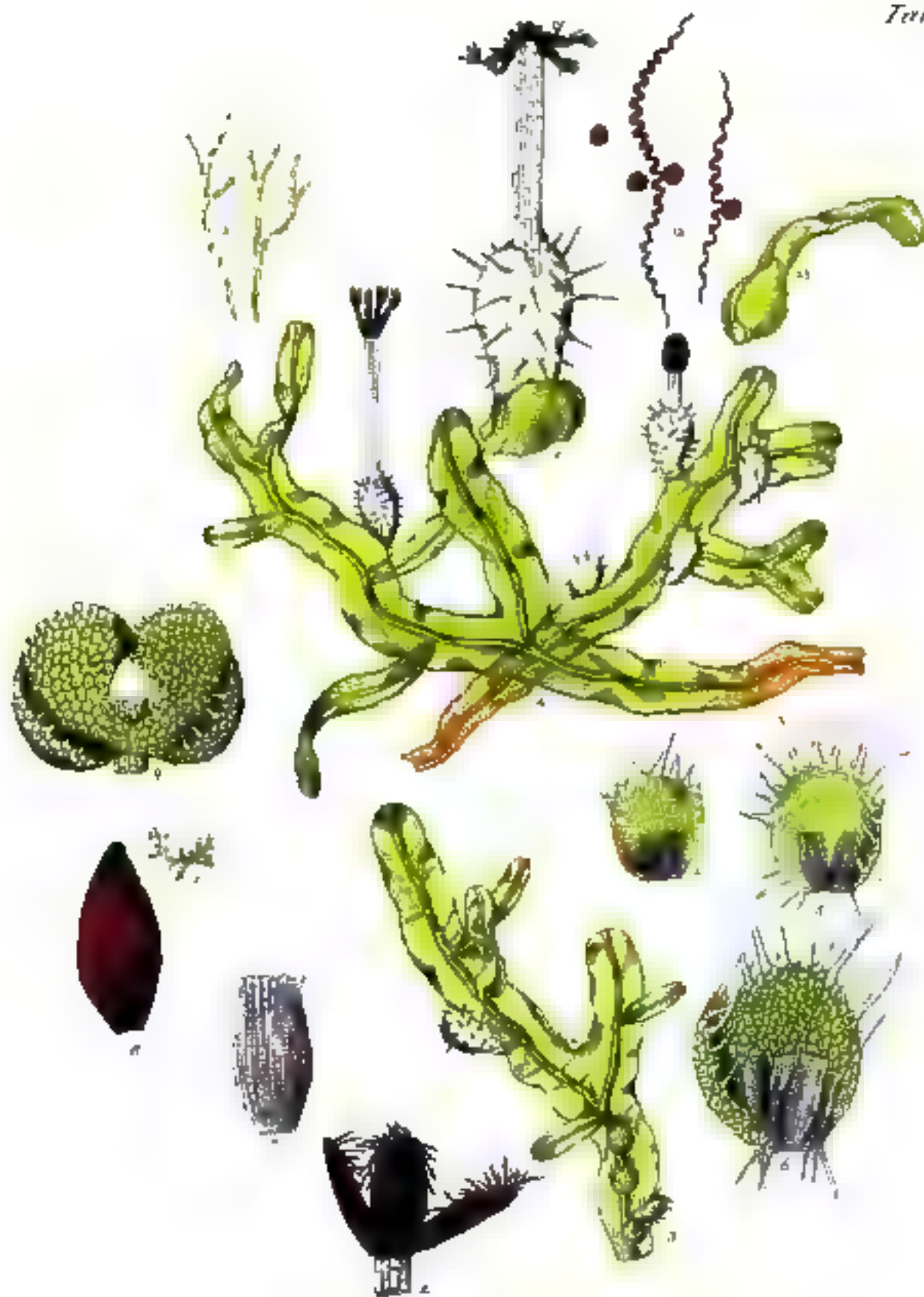
REFERENCES TO THE PLATE.

FIG.

1. <i>J. Hookeri</i> , male plant, natural size.	
2. Female plant, natural size.	
3. Male plant, magnified.	6
4. Apex of a male plant, with the Anthers.	4
5. Perigonial leaf.	2
6. Anthers	1
7. Female plant, calyptra still entire.	6
8. Female plant, with capsules.	5
9. Extremity of a young female plant, with the germs and abortive pistilla.	4
10. Exterior view of a perichetial leaf	9
11. Interior view of the same.	2
12. Immature seeds and spiral filaments.	1
13. Perfect seeds.	1
14. Spiral filaments	1



Agardhiella subulnifolia



Jungermannia fuscata

JUNGERMANNIA FURCATA.

(TAB. LV. LVI.)

JUNGERMANNIA, fronde lineari, dichotomâ, membranaceâ, costatâ, superiâ laevi, subtis, margineque plus minusve pilosâ: fructu ex inferiore parte costæ egresso; calycibus bilobis, conduplicatis, margine ciliato; calyptrâ obovatâ, hispida.

Jungermannia furcata. LINN. *Sp. Pl.* i. p. 1602. *Syst. Nat.* ii. p. 707. POLLOCK, *Pal.* iii. p. 201. *Pl. Schreb.* p. 231. SCHRANK, *Berol.* ii. p. 300. WERN, *Spic. Fl. Goet.* p. 159. WEIS, *Plant. Crypt.* p. 166. WILD. *Ber.* p. 344. SCOP. *Carp.* ii. p. 356. VILLARS, *Delph.* iv. p. 988. SCHNEIDER, *Spic. Fl. Lips.* p. 109. ENCH. *Pl. Fl. Dan.* p. 63. HOFFM. *Germ.* ii. p. 90. ROTZ, *Germ.* iii. p. 413. HEDW. *Tb.* t. 19. f. 99. 100. et t. 20. LINN. *Syst. Nat.* ed. Gmel. ii. p. 1333. LAMARCK, *Encycl. Method.* iii. p. 287. LAMARCK, *Fl. Fr.* ed. 2. t. ii. p. 437. LAMARCK, *Fl. Gall.* p. 91. BELMAN, *Cont.* p. 441. HUND. *Engl.* p. 516. LIGHTF. *Scot.* ii. p. 791. WITTR. ii. p. 860. *Engl. Bot.* t. 1632.

Lichenastrum saxatile erectum, tenuifolium, furcatum. CAL. ORB. p. 913. (*vide DILL.*)

Marchia squamata, foliis subrotundis, stratis, erectis, furcatis. BUCK. *En. Pl. Hol.* p. 296 (*vide DILL.*)

Ulex saxatilis furcata, latiuscula et tenuioribus segmentis. RARI *Syn. Stirp. Brit.* iii. p. 63.

Hepatica arborea globuligera. VALL. *Bot. Par.* p. 98. t. 23. f. 13.

Marsilea minima angustifolia, floribus nigricantibus, ex inferiori foliorum parte & apicibus et lobis vaginis erumpentibus. MICHX. *Noe. Gen.* p. 5. t. 4. f. 4.

Lichenastrum tenuifolium furcatum, thecis globosis pilosis. DILL. *Musc.* t. 74. f. 45.

Jungermannia foliis linearibus dichotomis, inferius florifera. HALL. *Hid.* ii. p. 64.

β. ELONGATA, frondibus majoribus, elongatioribus strictioribusque.

J. furcata β. saxicola. WERN, *Spic. Fl. Goet.* p. 160.

γ. MAGNOLIA, frondibus latioribus, apicibus (in gemmiferis plantis exceptis) dilatatis, obtusiusculis.

Micla fruticulosa. DICHA. *Plant. Crypt. Ruc.* 2. p. 3. (*excl. typ. Fl. Danicæ*). WITTR. iii. p. 870. HULL. p. 263.

Jungermannia fruticulosa. *Engl. Bot.* t. 2314.

HAB. Abundant in every part of the kingdom, growing as well upon the trunks of trees, and low bushes, as upon stones, rocks, and even on healthy ground. (Producing fructification, according to Dr. Taylor, from October till March.)—β. is not uncommon upon rocks, and

on the ground, in subalpine countries.—*y* has been found in various parts of Ireland by Miss Hutchins, Mr Templeton, Mr Turner, and Mr Morbey.—At Kinnedy, Scotland, by Mr Lyle, and near Forfar by Mr George Dox: but no fructification has hitherto been discovered upon this variety.

PLANT growing in large dense patches, closely appressed to the surface, which affords it nourishment.

The *haustia* consist of simple, white fibres, produced here and there from the lower surface of the midrib of the frond, and not easily distinguished from the hairs which are intermixed with them.

Fronds from half to three-quarters of an inch or rather more in length, creeping, horizontal, lying over each other in an unobscured manner in width scarcely equaling half a line throughout: linear thin and submembranaceous, slightly wavy, the margins quite entire, nerves (except in a very young state) simple, always branched in a somewhat dichotomous manner, with the channel furcate for the most part at the extremity, whence the nerve the spore obtains. The upper surface is destitute of hairs or covering of any kind, but the margin and the surface beneath are lined more or less thickly with rather stout, white, and simple hairs, which upon the margin have very frequently a ciliated appearance. The texture is delicate, the reticulae roundish. The color a pale and pleasant green. Throughout the whole length of the frond and its ramifications a central, slender, but very distinct, nerve or midrib extends, on the lower surface alone of which are seen a few holes: these are given rise to innovations, which are to be observed at almost every season of the year, and in various stages of growth, from the young, white, and almost nerveless shoot (L. LV. f. 17), to the larger, rather-bearing, and branched kind, which in every respect resembles the parent, separating from it in a little time, throwing out roots, and becoming a new and distinct individual.

Male FRUCTIFICATION abundant on distinct individuals from the female (see TAB. LV.), placed within a perianth receptacle or perigonium, attached to the underside of the frond (f. 15, 16) and always upon the midrib. It has the appearance of being a young shoot or innovation (for in color and texture I can perceive no difference) rolled up into a spherical figure, and generally beset externally with bristle-shaped hairs (f. 24). It is sufficiently pedicel to admit of the

Anders being obscurely seen within, and on cutting or tearing open a perigonium (f. 19), they may be distinctly seen to be fixed, in clusters of three or four in each, to the midrib.

They are of an oval or spherical form (f. 20, 21), fully reticulated in an early stage of growth, more remarkably so when arrived at their full size. The footstalk is very short, white, obscurely striated.

FEMALE FRUCTIFICATION (TAB. LV.) arising from various parts of the lower surface of the midrib.

The *calyx* at first resembles a scale (f. 3 b), appressed to the frond, of a roundish form, convex on the external surface, at the extremity, and, indeed, not unfrequently along the whole margin, very minutely fringed with long whitish cilia or hairs. At a more advanced period (f. 6) it may be seen to be two-lobed, and when the calyptra is exerted the calyx is cut into two very deep, subreniform lobes, which are multiplicate, reduplicating the base of the calyptra (f. f. 3 B and 9). These, I have great reason to believe, shoot out into innovations, after the decay of the fructification, for their two-lobed figure gradually disappears, and the calyxes are converted into shoots, like that represented at f. 13. of TAB. LV.

Perithe (F. I. B. 6, 7) rarely more than three or four in each calyx. large, broadly ovate, the mouth a little expanded and acute. They are thinly marked longitudinally and transversely with dusky lines.

Calyptrae clavate, carinate, curved at the base, which, as has been already remarked, originates in the underside of the frond, even, at the extremity of a whitish seta, bent on every side with many white, rigid hairs or bristles, which stand out for the most part in a horizontal direction, and give the calyptra a remarkably hispid or almost echinate appearance. An irregularly torn but vertical fringe is formed for the entrance of the capsule.—I have not been able to discover any style.

Peristome about three as long as the calyptra, rather wide in proportion to its length, white, cellular, tipped with the teeth, or *peristome-teeth*.

Capula, which is of a deep brown color (F. 16), strongly emarginate, opening into four equal outer valves, that run half back and inward twisted.

Spores spherical (F. 14), brown, or brownish—the spiral filaments are of the same color, composed each of a single helix of considerable length, and much attenuated at each extremity. Many of them continue to adhere at the apex of the valves of the capsule, as in *J. Mackenzii*, *J. pungens*, &c.

Var. β . (F. 5) scarcely differs from α , but is the larger size, and more elongated, as well as structure, habit. It is also of a more yellow color than the usual appearance of the plant.

Var. γ . (L. or F. 94, 95) is quite remarkable for its color, which is of a fine verdigris green, especially towards the apex of the frond, which are however considerably dilated, and the whole plant is of a more delicate texture than is the case in α . A farther difference may be observed in the apothecia, which in γ is frequently forked within the frond, and immediately below the apex. I can even say that this peculiarity is occasionally seen in α , but it is so much more common in the argillaceous variety, as partly to excite it to observation. With regard to the color of γ I ought to remark that it is sometimes, but not always, visible in a fresh state, Mr. Turner and Mr. Mackenzii having been directed to the latter by this circumstance—whereas Mr. Loph and Mr. Tompkinson both observe that it becomes argillaceous after having been kept for a length of time in a dried state. In all other respects this var. resembles α , and like it produces abundant immatures. By these it increases, but not by their alone, for numerous terminal clusters of gemmae have been found upon this variety, first by Mr. Loph, and afterwards by Mr. Don and Miss Mackenzii. In a gemmiferous state the present individual has a new and very striking character, for the lateral ramuli (F. I. 95, 96) have their margins so much recurved as to make them appear almost cylindrical, and at their apices the gemmae are formed, and adhere, though slightly, in clusters. These gemmae (F. 96) vary much in size, and not a little in form; but they all agree in being of the same cellular structure as the plant, and in this respect resembling the gemmae of *J. micrantha*. As first they are rounded or ovate, afterwards more oblong, and when they fall from the frond they may be seen to have marginal hairs. Although I have not had the opportunity of seeing them in a more progressive state, I think there cannot be a doubt that they are destined every one to form perfect plants. Their color is of the same argillaceous green as the frond.

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(*J. furcata*.)

BRITISH JUNGERMANNIÆ.

Jungermannia furcata is one of the most common species of the genus, and, as such, is familiar to every student of Cryptogamic Botany. The conformation of its various parts, however, is deserving of the most minute investigation, for I have scarcely met with any species which offers at the same time so much beauty and singularity of structure united. Hitherto the curious calyx, the perigonium, and the gemma, have escaped the notice of writers upon the subject, or have been but very imperfectly and incorrectly described. Even the illustrious Halwig has been far from happy in his account of the antheriferous receptacle, the calyptra, and the seeds, all of which differ considerably from what I have myself had the opportunity of examining. In another part of this Monograph I shall have occasion to speak more fully on this subject. Roth is surely incorrect, when he says "Calyx ex averta frondium pagina propulsiua, adscendens, conicus, ovatus, hirsutus, viridis. Corolla calyce brevior, tenuissimæ," and further, "ab omnibus hujus phlogæ in eo recedit hæc planta, ut calyx ex averta frondium pagina adscendat tubulosus, ovatus, corollam minorem incudem cum in reliquis calyciformem e frondis substantiis per integumentum commune dilaceratum protrudatur." The corolla is surely the part that is protruded, and in this particular accords with all the rest of the *Jungermannia frondosa*. In its delicate texture, and in the strongly marked though slender midrib, *J. furcata* resembles *J. Lyallii*, from which, and from every other species in the genus, it is nevertheless abundantly distinct.

There is no reason whatever for considering the var. γ a *Riccia*. The *Riccia fruticulosa* of *Flora Danica*. I fully agree with Dr. Smith in thinking quite a different plant, and probably (if I may be allowed to judge from the figure) the *Jungermannia palmata* of Hoffmann.

REFERENCES TO THE PLATES. (TAB. LV. AND LVI.)

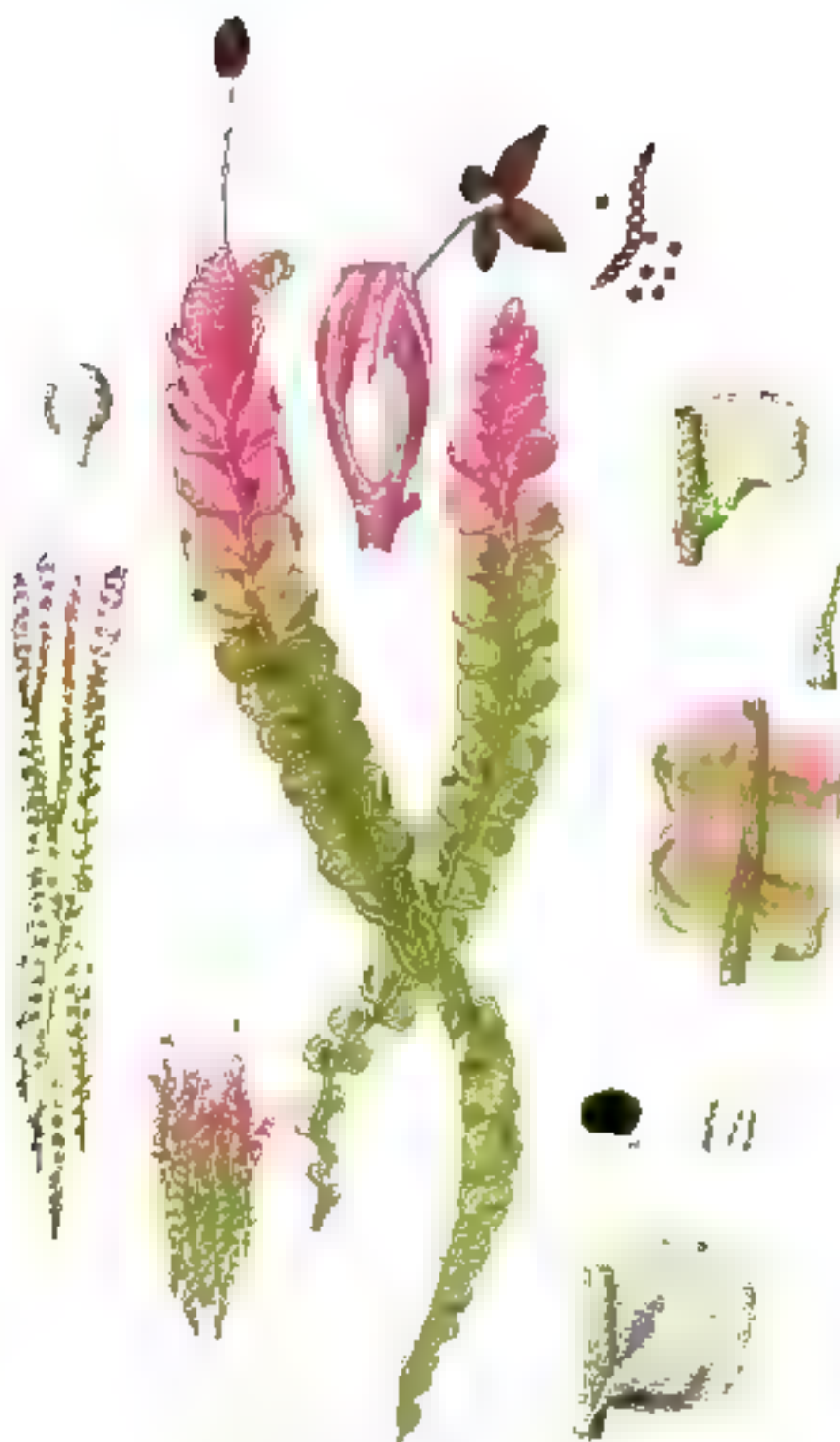
(TAB. LV.)

fig.		
14.	<i>J. furcata</i> , with male fructification, natural size.	
15.	The same, magnified.	6
16.	A portion of the stem and innovation, with male fructification.	4
17.	Portion of a gemmiferous plant, seen from the under side.	4
18.	Perigonium, with the anthers included.	3
19.	Perigonium torn open.	3
20.	Anther in a young state.	1
21.	Anther fully formed.	1
22.	Var. γ , natural size.	
23.	The same, magnified.	6
24.	Gemmiferous plant, natural size.	
25.	The same, magnified.	6
26.	Gemma.	1
27.	Gemmiferous plants, showing the under surface, natural size.	
28 and 29.	The same, magnified.	6

(TAB. LVI.)

fig.		
1.	<i>Jungermannia furcata</i> , female plant, natural size.	
2.	Var. β , natural size.	
3.	Under side of a female plant, with the fructification in various stages of forwardness, magnified.	6
4.	Fertile plants, upper side.	6
5.	Calyx in a young state, and pistillate.	4
6.	A calyx more advanced.	3
7.	Pistillum.	1
8.	Calyx, corolla, and capsule.	3
9.	Calyx expanded.	4
10.	Capsule opened.	3
11.	Vase of the capsule.	1
12.	Seeds and spiral filaments.	1
13.	Calyx lengthening into a throat.	3





1. Branch with leaves and nut
 2. Branch with small fruits
 3. Single leaf
 4. Cluster of small fruits
 5. Single nut
 6. Small branch with small fruits

Jugosa americana - Juglans

JUNGERMANNIA TAYLORI.

TAB. LVII

Jungermannia a caule erecto, subsimplex, foliis lanceolatis, rotundatis, sessilibus peristatis, peristoma secundario pupis subulatis fructu terminali cylindrico ovato, apice truncato, truncato, biseriato.

Hab. Foulagee a lofty mountain in the county of Wicklow, Ireland. *Dr Taylor*—Found also in the vicinity of Hadry by *West Hatch* &c. Two miles from Ambleside, to the north of the Ribbles road, now on the rock behind the hill at Patterdale, near Ullswater Cumberland, in great plenty and in the highest beauty, together with *J. radialis* and *J. barbata* Mr. Lyell. A poor Corn-grass, and other mountains of the Highlands of Scotland.—Mr. Don finds it upon the Caves mountains.

Plant growing in rather large patches, as dense as base of *Sphagnum angustifolium*.

Roots issuing in thin tufts of simple, whitish fibres from near the base of the stipules.

Stems erect, from two or three to four and even five joints in length. Filiform, striate, simple, or more and dens producing one or two small ramifications, which are more generally found about the extremity of the stem, and especially in the fructified specimens, than in any other part of the plant, or in its barren state. The substance is rather firm, at the base even rigid, when dry and brownish, towards the apex more succulent, having the cellular structure visible with a tinge and of a green or purplish tinge.

Leaves about three quarters of an inch in length at least near the middle of the fertile individuals, &c, as they recede from that part. They gradually become smaller &c.

In the fertile plants, on the contrary, the largest leaves are those which approach the calyx (f. 4). They are every where rather closely and uniformly placed, slightly imbricating each other, somewhat horizontally patent with regard to the stem, or not unfrequently, erect and somewhat as is represented at the base of fig. 4. Their form is round or suborbicular plane or very slightly concave, at the margins entire, sometimes a little waved, and at the extremity a small portion is generally recurved as is more distinctly seen on the underside of the leaves (f. 5). Their base is decurrent and obliquely semi-

anplexicaul. The substance is, in a striking degree, thick and subcoriaceous, the cellular large, of a roundish figure, but by no means regularly or closely placed (f. 6), when dry, from the circumstance of the shrinking of the cellular, a curiously punctated appearance is observable even with the naked eye. The color is of a dingy but yellowish-green at the base of the plant, gradually assuming a purple tint as the leaves approach the extremity of the plant, where they are entirely of that color.

Stipules (f. f. 7-8) though minute, always present, widely subulate, and, like the leaf, composed of cellular of a roundish form, and large in proportion to the size of the stipule. Their color is usually pale green.

Perigonal leaves more concave, and for the most part more crowded than the rest, at the base they are a little swollen, and the margin is there incurved (f. 8).

Of the Perichetial leaves there is one erect pair to the base of each calyx, in which they are in a slight degree appressed, their margins are frequently a little wavy.

Male Fructification (f. 8) generally near the centre, but sometimes at the extremity of the stem: two or three spherical polynucleated.

Antlers (f. 9) are situated in the axilla of each perigonal leaf.

Female Fructification terminal.

Calyx (f. 10) ovate, or oblongo-ovate, by no means plicate, cylindrical, except at the apex, where it is compressed, truncate, very obsoletely toothed, and divided into two short lips. In color and texture it closely resembles the leaves, but the cellular are of a more oblong shape.

Gynæceum obovate (f. 10): whitish, somewhat membranaceous, reticulate, tipped with a short tubular style. A few small barren pistilla surround its base.

Peduncle short, being scarcely three times the length of the calyx, white, cellicose.

Capsule ovate, dark brown, furrowed longitudinally and transversely, splitting into four equal valves (f. 10).

Seeds spherical: fulvous. Spiral filaments composed of a double hair: short, rather closely twisted (f. 11).

Obs. Upon the leaves of this species, a very minute, nearly spherical, blackish, tuberculated Fungus is frequently to be seen, and I have figured it in the annexed plate (see f. f. 3, 4, 12, 13). Internally, along with a whitish mucilage, it contains a number of oblong pellucid bodies, each with from two to four ovate brownish seeds. A very similar parasite, if not the same, is found also on the leaves of *J. scaberrima*, but I am not aware that they have ever come under the notice of any writer upon the subject.

I have already mentioned, under my description of *J. annuata*, the distinguishing marks between that species and the present, and I have little more to add, but that my own subsequent observations, as well as those of Mr. Lyell, who has lately had the best opportunity of examining the two plants in their native places of growth, have more and more strengthened the opinion that

they are truly different. Notwithstanding the unwearied exertions of the able Botanist just mentioned, the fructification of *J. anomala* has hitherto eluded his research, but, whatever be the fate of that plant, the one here described, and named after my friend Dr. Taylor, of Dublin, will, I trust, be permitted to hold its place in the list of species, as a memorial of the great assistance which I have derived from one of the most zealous and acute Cryptogamists of the present day.

Mr. Lyell observes that *J. Taylori* has an agreeable odor, which resembles that arising from the flowers of the Heath.

REFERENCES TO THE PLATE

FIG.

- | | | |
|-----|---|---|
| 1. | <i>J. Taylori</i> , male and female plants, natural size. | |
| 2. | Sterile plants, natural size. | |
| 3. | Male plant, magnified | 6 |
| 4. | Female individual | 6 |
| 5. | Portion of the stem seen from beneath | 5 |
| 6. | Leaf | 4 |
| 7. | Stipule | 3 |
| 8. | Perigonial leaf | 4 |
| 9. | Anther | 1 |
| 10. | Calyx, Calyptra, and Capsule | 5 |
| 11. | Seeds and spiral filaments | 1 |
| 12. | Parasitic Fungus detached from the leaf | 2 |
| 13. | Seeds of the same, enclosed in a pellicular covering | 1 |





Jungmannia complanata

BRITISH JUNGERMANNIÆ.

(*J. compressa*.)

JUNGERMANNIA COMPRESSA.

(TAB. LVIII.)

JUNGERMANNIA, caule erecto, diviso foliis bifidis, orbiculatis, (runcatis subreniformibus,) plantis, erectis, appressis stipulis in innovationibus junioribus, minutissimis, bilobis integrisque; in caule nullis fructu terminali; calycibus perichætiis immixtis, oblongis, carnosis; ore aperta, quadridentato.

HAB. Mountain rivulets, near Bantry. *Moss* (Sketching).—Lough Bray. *Dr. Taylor*.—(It produces fruit in the month of June.)

PLANT growing in dense, purplish tufts, of some inches in diameter.

Roots, scarcely any; a few simple fibres may here and there be seen near the base of the plant.

Stems varying from two to six inches, or more, in length, erect, or only growing in a horizontal direction, when carried down by the force of a mountain streamlet, filiform, flexuose, branched, or at least appearing so, in consequence of the innovations, which are rather copiously produced, and are often of such a size as scarcely to be distinguished from the stem itself—all of a brown or purplish color, and a cellular texture, though, in the older parts of the plant, the cellular are obscure, and almost obliterated.

Leaves often three-fourths of a line in length, varying in size in different parts of the plant; but in general largest at the extremity of the stem, both in the fertile, and in the sterile individuals—they are closely but alternately placed, imbricating each other in a very regular and beautiful manner, erect, appressed, and, from their pellucid nature, suffering the stem to be seen through them, dividing each of them, as it were, into two nearly equal halves (f. 5). In figure, they are for the most part orbiculate, except those at the extremity, which are nearly reniform, all plane, decurrent at the lower margin, and every where entire. In some individuals, which have been subject to the action of a current of water, the leaves are at intervals distantly placed, and often decayed (f. 4), and, on the young innovations, they are much less closely arranged, somewhat concave, and have not unfrequently an oblique direction (f. 6). The texture of the leaves is semi-pellucid, peculiarly thin and delicate, as as to be almost membranaceous, but, when dry, somewhat rigid; the cellular are scissile, those at the margin of a regularly subquadrate form. The color is in the lower leaves a pale yellowish green, while those above are of a fine deep purple.





Jungermannia lasyophylla

JUNGERMANNIA LAXIFOLIA.

(TAB. LIX.)

JUNGERMANNIA, caule erecto, simpliciosculo, filiformi: foliis distantibus, quadrifidis, erecto-patentibus, ovatis, subseriatis, acutis bilidis, (perichætiolibus simplicibus) fructu terminali; calycibus oblongis, subplicatis, ore contracto, depresso.

HAB. Mountain rivulet, near Bentry. *Miss Hatchlar*.—In a stream upon Castle-Kelly mountain, county of Wicklow. *Dr Taylor*.—(The sporules are perfected in April. Calyxes are found during most of the summer months.)

PLANT growing in small, but very dense, green tufts or cushion-like patches.

Roots (as in *J. compressa*) scarcely any; the few that do exist are confined to the lower part of the stem.

Stems erect, filiform, flexuose, about half an inch long, extremely slender, simple, or bevel with one or two innovations, uncertain as to their place and length, but always more slender than the main stem, and undivided. The substance is tender and fleshy, composed of large, conspicuous, oblong cells: the color a pale green, approaching in some instances to olive.

Leaves (f. 3) distantly and alternately placed, arising from four sides, of large dimensions when compared with the diameter of the stem, becoming, however, gradually smaller as they recede from the apex: the smallest are seen upon the innovations, they are all patent or erecto-patent, ovate, generally slightly emarginated, and cleft, for about one-third of their length, by an acute sinus, into two equal, rather sharp, but altogether entire segments. Their texture is peculiarly soft (if I may be allowed the expression) and fleshy, the reticulation very large, and formed by oblong reticulae (f. 4).

Perichætiol leaves larger than the rest, and, what is remarkable even more distantly placed than the cauline ones, not unfrequently leaving the whole calyx exposed (f. 2).

MALE FRUCTIFICATION unknown.

FEMALE FRUCTIFICATION terminal, or, if apparently lateral, only rendered so by the circumstance of an innovation being produced immediately beneath it.

(*J. lasifolia*.)

BRITISH JUNGERMANNIÆ.

Calyx (f. 4) large, oblongo-ovate or obovate, for it generally increases in size upward, very slightly plicate, the mouth contracted and toothed. It is of the same color and texture as the leaves.

Calyptra (f. 5) ovate, membranous, whitish, reticulated; style short. *Barren pistilla* small, situated at the base of the calyptra.

Pedicels scarcely more than twice the length of the calyx, white, cylindrical, succulent, cellulose.

Capsule exactly spherical, opening into four equal acute valves, which are longitudinally and transversely furrowed.

Seeds (f. 7) spherical, and, together with the spiral filaments, of a fulvous brown; these latter formed of a double closely-twisted helix.

J. lasifolia belongs to that division of *Jungermannia*, which have their leaves placed in a quadrifarious manner, and of which no few species have hitherto been detected. With *J. julacea* it will be seen to have many points in common but will be found to differ materially, not only in the greater size and larger cells of the leaves, but also in the form and disposition of the perichaetial ones, in the texture of the foliage, and in the color. In these last particulars approaching *J. bicuspidata*, a species from which it otherwise is abundantly distinct.

Hitherto this elegant little species has been found only in Ireland, a country no less fertile in rare and singular plants, than fortunate in Botanists both able and willing to detect and investigate them.

REFERENCES TO THE PLATE.

FIG

1. <i>J. lasifolia</i> , natural size.	
2. Fertile plants, magnified	6
3. Portion of the stem, and leaves	4
4. Calyx and perichaetial leaves.	3
5. Calyptra	3
6. Barren pistilla	1
7. Seeds and spiral filaments	1





Polypodium vulgare

JUNGERMANNIA VITICULOSA.

(TAB. LX.)

JUNGERMANNIA, sterulo procumbente, ramosa foliis hirsutis, subimbricatis, horizontalibus, planis, ovatis, integris: stipulis latè ovatis, densato-laciniosis fructu laterali; calycibus subterraneis, oblongis carnosis, ore squamis foliaceis strabatis.

Jungermannia viticulosa. LINN. *Sp. Pl.* ii. p. 2697. *Syst. Nat.* ii. p. 705. NUCK. *Meth. Musc.* p. 134. SCHRANK, *Davor.* i. p. 404. LAMOUR., *Herb.* p. 949. ALLIOTT, *R. Ped.* ii. p. 311. WEBB *Plant. Crypt.* p. 412. WEBER, *Spiz. Fl. Gœt.* p. 152. HOFFMANN, *Germl.* ii. p. 88. ROTH, *Germl.* i. p. 371. OZONB., *Enum. Pl. Fl. Dan.* p. 41. HUDS. *Angl.* p. 509. LAMOUR. *Scot.* p. 772. BILMAN, *Cont.* p. 439. LINN. *Syst. Nat. ed. Orel.* ii. p. 1349. WITTE, *iii.* p. 865. LAMOUR. *Encycl.* iii. p. 379. LAMOUR., *Fl. Fr. ed. 2.* t. ii. p. 430. LAMOUR., *Fl. Gall.* p. 92. MICHX., *Fl. Bor. Am.* ii. p. 311. *Engl. Bot.* t. 2513 (*bore.*)

Lichenotremis capitata RADII, *Trichomanes fœcie, foliolis densius congestis, major*. RAB. *Syn.* p. 111.

Jungermannia terrestris, viticula longis, foliis perispermis, dentatis, ex rotunditate acuminalis. MICHX., *Nep. Gen.* p. 8. t. 5. f. 4 (*figura bore.*)

Jungermannia, foliis pinnatis, subrotundis, ex caule floriferis. HALL, *Hib.* iii. p. 80.

HAB. In subalpine countries, far from uncommon, in various parts of England, Scotland, and Ireland, growing, as well upon the ground, as upon stones and other *Jungermannia*. (It bears fructification in the spring months.)

PLANT growing in loosely-matted patches of various sizes, rendered conspicuous by their yellowish brown color.

Root a few whitish, simple fibres, proceeding in small clusters, the whole length of the stem, from beneath the stipules.

Stems varying in length from one to three inches, filiform, slightly branched, simple, or, as generally happens, divided by innovations of various lengths, that are potent, and resemble the parent stems in every thing excepting size. All are procumbent: their texture is firm, rather rigid when dry; the cellular very compact: the color is dirty reddish brown.

Leaves about half a line long: smaller towards the extremity and at the base, alternately, but rather closely and very regularly, arranged in a bifarious manner, horizontal, plane, or

(*J. villosula*.)

BRITISH JUNGERMANNIÆ.

slightly convex on the upper surface, of an exactly ovate figure, widest at the base, where they are a little decurrent, their margins always destitute of every kind of incision, and serratures. The substance is somewhat firm; the cellular minute and roundish; the color a yellow brown, or only green when growing in a very shaded situation.

Stipules (f. f. 3, 5) small, widely ovate, approaching to round, the margin more or less toothed and incised; the apex usually furnished with a long point.

Perichætal leaves none, at least there are none that differ in the slightest degree, either in shape or direction, from the rest.

Mass Pustularication Lutheri habundans.

Fructification Frustricarius originating from the under side of the stem, and beneath the stipule.

Calyx this, in a young state (f. f. 6, 7, 8), is cup-shaped, and situated upon a short curved stalk. Its margin scaly or slightly foliaceous, its base very thick and carnosæ within are the pistils (f. 7) in proportion as it advances to its full size, the thick base descends, and at length forms a hollow oblong pouch or sack, nearly a line long (f. 10) the point of attachment of which with the stem is seen to be at the margin. The mouth is a little expanded, and the scales there situated are, before the exertion of the peduncle, incurved. This calyx is imbedded in the earth among the mosses and Jungermanniæ to which the plant may happen to be attached. It is smooth or presents only short, minute, and irregular striæ on its outer surface, its color is a dirty white.

Pistilla (f. f. 7, 9) seven or eight in number, lanceolate; the mouth a little expanded.

Calyptra (f. 11) whitish, thin, membranaceous, reticulated, when it has reached its full size, about three-fourths of the length of the calyx, to the inside of which it is closely appressed, if not attached, for I cannot separate the one from the other without injury. The apex is crowned with a short style.

Peduncle about an inch or an inch and a half long, white, cylindrical, cellulosæ, tipped with the brown oblong-ovate.

Capsule, which opens into four narrow straight valves, divided by a number of transverse and longitudinal furrows, and the interstices again marked by dark lines running in similar directions (f. 13).

Seeds and spiral filaments (f. 14) fulvous. The former spherical, the latter formed of a double helix, rather closely twisted.

Almost all the above synonyms I have quoted in compliance with the opinion of preceding Botanical authors, rather than from any conviction of the propriety of so doing: no vague and unsatisfactory are the descriptions with which they are accompanied. Two alone can be depended upon with any degree of certainty, the Michelin figure and that of *English Botany*. From the circumstance of *Linnaeus* having referred to the really excellent figure of Micheli, there is reason to believe that he intended the same plant, yet, how strange it is, that he should have described it in the *Species Plantarum* "*foliis subulatis*!" This, we are informed*, the illustrious author had

* See Dr. Smith in *English Botany*, p. 2513.

armed in his own copy, but in the *Systema Naturæ* he has fallen into an error equally great, in describing the species "foliis planis nullis linearibus." In the character given by Necker, there is nothing to distinguish *J. viticulosa* from many other species; and Pollich appears rather to have had some slight variety of *J. asplenoides* in view, when he says, "Folia disticha, fere orbicularia, margine modò integerrima sunt, modò etiam levitèr denticulata apparent." Weis, too, describes the leaves "marginis ciliatis;" whilst Weber says, that they are to be distinguished from those of *J. asplenoides* by their being entire.

No author whatever appears to have been acquainted with the fructification of this singular species; the honor of discovering it was reserved for Miss Hutchins and Mr. Lyell; the former of whom has alone detected perfect capsules. The stipules too, which are far from being inconspicuous, have escaped the notice of every writer upon the subject, but Dr. Smith.

The curious structure and situation of the calyx are peculiarities which *J. viticulosa* has in common with a species, in other respects widely different brought by Mr. Menzies from New Zealand, as well as with one of our own country, *J. Trichomanis*, to which indeed it is in other respects likewise closely allied. The differences to be observed are, the pale color, the very cellular texture, the convex leaves, the simply emarginate stipules, and the linear or cylindrical figure of the capsule of *J. Trichomanis*, which species moreover has the valves of the capsule twisted in a very remarkable manner. All of those characters, as may be seen by the above description, are inapplicable to our *J. viticulosa*.

Dillenius was ignorant of this species. His figure quoted for it in *Hist. Nat.* is *J. polygonifolia*, which he has represented twice.

REFERENCES TO THE PLATE.

710.

1. <i>J. viticulosa</i> , natural size.	
2. The same, magnified	6
3. Portion of the stem, with leaves and stipules, seen on the under side . . .	5
4. Leaf	4
5. Stipules	3
6. Under side of a fertile shoot, with the young calyxes	6
7. Calyx, with a portion cut away to exhibit the plastron	3
8. A young calyx, entire.	3
9. Plastron	1
10. Perfectly formed calyx.	3
11. The same, longitudinally dissected to show the calyptra and the peduncle . .	2
12. Portion of the calyx, showing its internal structure.	1
13. Portion of the valve of a capsule.	1
14. Seeds and spiral filaments	1





Songemannia scaberrima

JUNGERMANNIA SCALARIS.

(TAB. LXI.)

Jungermannia, caule repente, simplice: foliis rotundatis, concavis, integris emarginatisque; stipulis latè subulatis: fructu terminali; calyce perichætio immerso.

Jungermannia scalaris. SCHRADER, Semel. 1. p. 4. HOFFMANN, Germ. 11. p. 302. KORT, Germ. 11. p. 374.

Jungermannia incrassata. Engl. Bot. t. 805.

HAB. Abundant, upon a loamy soil, in woods, barren wastes, and hedge-banks.

PLANT growing in patches, covering a considerable surface of ground, the individuals generally densely crowded.

Root consisting of small, whitish bundles of fibres, originating from the lower surface of the stem, and near the base of the stipules.

Stems from a quarter to half an inch, or sometimes more, in length, simple, or rarely producing innovations, filiform, rather wide in proportion to their length, firmness, distinctly cellular, of a pale green color.

Leaves more or less closely placed in a distichous manner, patent and horizontal, (f. f. 4. 10) or erect (f. 7) they vary in length from a quarter to half a line, the smaller ones being found in general near the base, and at the extremity they are of a roundish figure, concave above, at the base semi-amplexicaul, for the most part having the margin entire but, in some individuals, the whole (f. 8), in others, a few only, placed here and there, without any kind of regularity, are emarginate at their apices. Their color accords with that of the stem: the *cellules* are small, rounded, sometimes obtusely quadrangular at the margin, but not strikingly larger than in the disk of the leaf.

Stipules (f. f. 9. 12) small, of a widely subulate shape, agreeing in color and texture with the leaves.

Perigonal leaves (f. 5) scarcely differing from the rest, except in having a swollen base, and the lower margin a little incurved on the upper side of the stem.

(*J. scalaris*.)

BRITISH JUNGERMANNIÆ.

Perichætal leaves larger than the cauline, emarginate and waved, united together for one-third of their length from the base, so as to form a hollowed receptacle, which may almost be considered an exterior calyx (f. f. 10. 11. 13. 14).

MALE FERTILIZATION.

Stamens (f. 6) of a spheroidal shape, reticulated, pedicellate—two or three are placed in the axilla of each perigonial leaf.

FEMALE FERTILIZATION always terminal.

Calyx (f. f. 13. 14) ovate, closely attached, by its external surface, to the interior surface of the tube or hollowed receptacle, formed by the perichætal leaves, the extremity above or mouth being free, this is cut into four large and equal-sized teeth or wide segments, which scarcely rise above the perichætium. The surface is more delicate than the leaves—the color a pale and dirty brown.

Germens ovate (f. 15), dark green, surmounted by a short, tubular style.

Calyptra ovate, membranous, reticulated.

Peduncle from a quarter to half an inch, or upwards, in length, white, pellucid, striated both transversely and longitudinally.

Capsule between roundish and ovate, dark brown, deeply furrowed longitudinally from the apex to the base, and these furrows connected by transverse ones—it opens into four equal ovate valves.

Seeds and spiral filaments (f. 16) of a dark brown or chocolate color—the former spherical, the latter composed of a double helix.

Obs. No *Gemma*, that I am aware of, have yet been found on this species; but its leaves, like those of *J. Tayleri*, produce a minute, black, luscid, nearly spherical fungus, attached usually to the upper surface of the leaf, and sometimes to the margin. This, when broken, gives out a semi-transparent pulpy substance, among which I can discover no traces whatever of seeds or granules. (See f. f. 4. 10. 17. 18. 19.)

The present species, although among the most common that this country affords, appears nevertheless to be little known, and is no where, that I can find, described with the accuracy which the curious structure of the calyx richly deserves. It has, indeed, a considerable affinity, in the form of its leaves in general, to *J. Tayleri*, as well as to *J. pusilla*, *J. sphaerocarpe*, *J. hyalina*, *J. lanceolata*, and *J. crenulata*. From the first of these, it may be known by its much smaller size, and more compactly cellular texture—from the rest, by the presence of the stipules; and, from the whole, by the immovæd calyx, in which particular it approaches *J. emarginata*, *J. juniperina*, and a few more, which are, in other respects, abundantly distinct.

Schmidel appears to be the earliest author who has described a *Jungermannia* under the name of *scalaris*—but I have little hesitation in pronouncing his plant, as well from the figure, as from his own account of it, to be no more than the gemmiferous state of *J. Trichomania*, as is, indeed, the case with the *J. scalaris* of most other authors. Specimens, however, from Schrader himself,

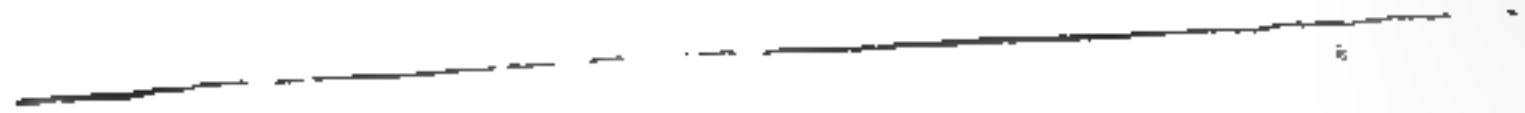
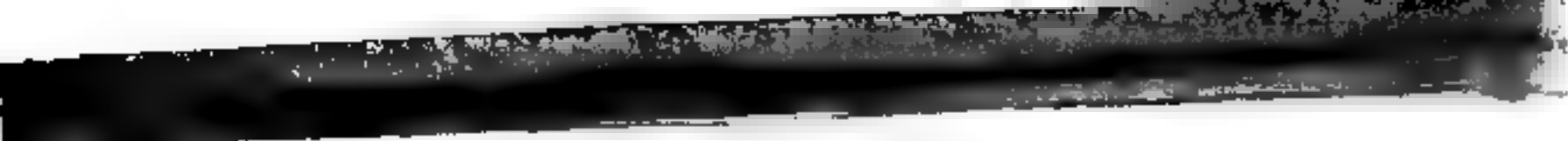
preserved in Mr. Turner's Herbarium, prove the *J. scalaris* of his *Syst. Seminal.* to be the same as the one here represented, but still I dare not venture to quote Hoffmann and Roth's plants without considerable doubt. It seems possible that the former may be our *J. Trichomanes*, but there is no mention made of the fructification, and the calyx of *J. scalaris*, as described by Dr. Roth, appears rather to accord with *J. crenulata*, which that writer probably confounded with it. No author, whatever, has remarked the stipules.

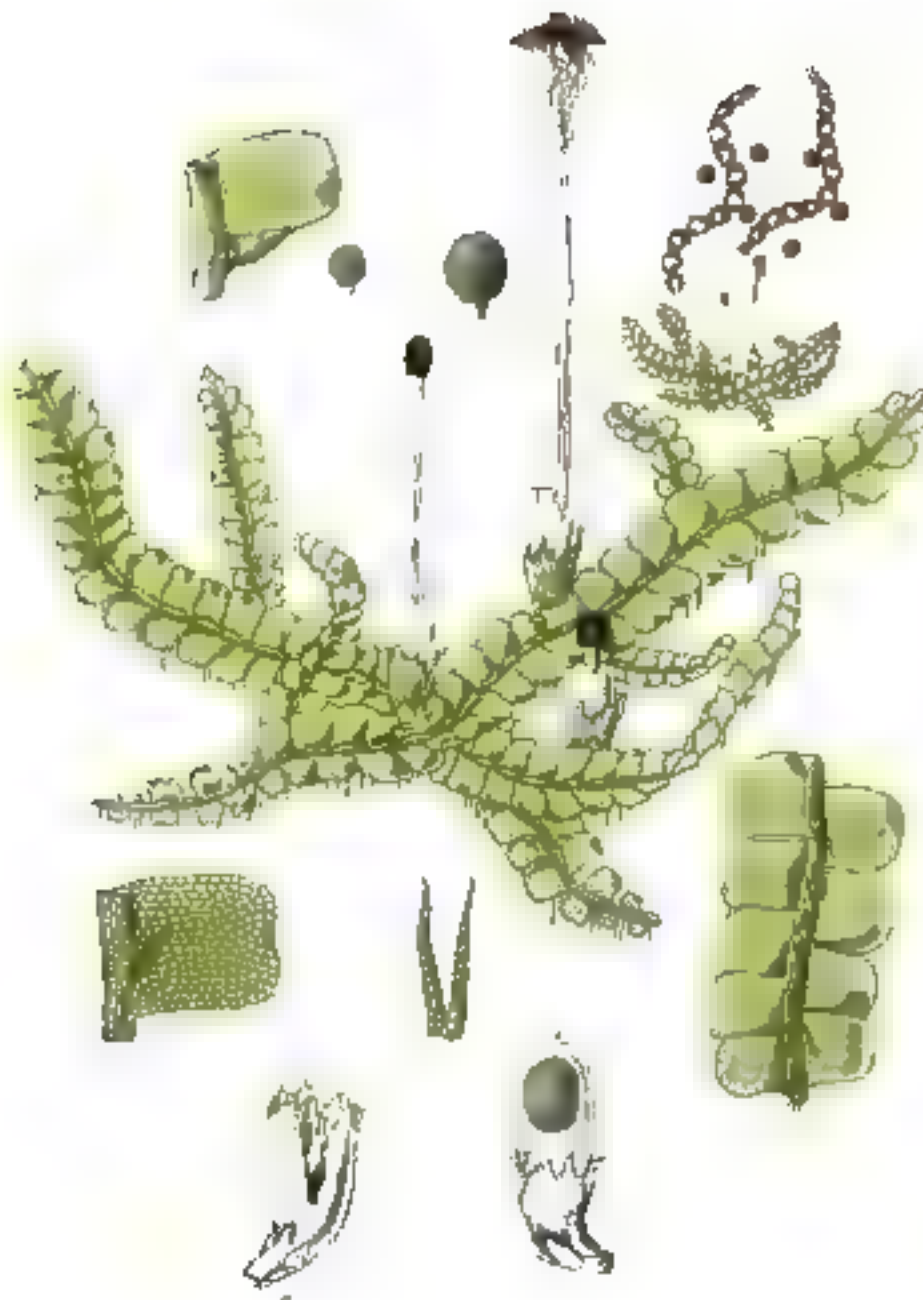
J. scalaris is represented in *English Botany* under the name of *laevigata*, but the unmagnified figures are taken from unusually luxuriant specimens, and are much larger than any individuals that have fallen under my own observation.

REFERENCES TO THE PLATE.

210.

1.	<i>J. scalaris</i> , male plant, natural size.	
2.	Female plant, natural size.	
3.	Barren shoot.	
4.	Male plant, magnified.	6
5.	Perigynial leaf and Anthers	3
6.	Anther	1
7.	Barren shoot, with erect leaves	6
8.	Far with emarginate leaves	6
9.	View of the under side of the stem, showing the stipules	6
10.	Female plant	6
11.	Calyx and perichætium	6
12.	Stipule	1
13.	14. Calyx and perichætium longitudinally opened	3
15.	Capode, after the discharge of the seeds	3
16.	Seeds and spiral filaments	1
17.	Leaf, with its parasitic Fungus	4
18.	The Fungus detached from the leaf	1
19.	The same, burst	8





Sangermannia polyanthos

JUNGERMANNIA POLYANTHOS.

(TAB. LXII.)

JUNGERMANNIA, stipulo procumbente, squamato: foliis biduatis, subimbricatis, horizontalibus, planis, rotundato-quadratis, integris emarginatisque, stipulis oblongis, bifidis fructu in ramis propriis, ex parte inferiore oculis egredientibus, lateralibus; calycibus calyptra diaphana breviteribus, bilabiatis, laciniatis.

Jungermannia polyanthos, Linn. Sp. Pl. p. 1597 Syst. Nat. II. p. 706. SCHREANK, Beror. II. p. 459. POLICH, Pelet. III. p. 178. WELS, Plant. Crypt. p. 113. LAMOUR, Herb. p. 249. VILLARS, III. p. 495. HOFFMANN, Germ. I. p. 88. ROTH, Germ. III. p. 373. OEDER, Enum. Pl. Fl. Dan. p. 41. HEDD. Angl. p. 510. LIGHT, Scot. II. p. 773. WITT. III. p. 855. LAMARCK, Encycl. Bot. III. p. 273. LAMARCK, Fl. Fr. ed. 2. II. p. 431. LAMARCK, Fl. Gall. p. 92. Engl. Bot. t. 2479. Linn. Syst. Nat. ed. Gmel. II. p. 1346.

Jungermannia viscinosa, B. WERN. Spic. Fl. Gall. p. 133.

Jungermannia aquatica, SCHREANK, Beror. II. p. 496. Linn. Syst. Nat. ed. Gmel. II. p. 1349.

Jungermannia fragilis, ROTH, Germ. III. p. 370. EHRH. Crypt. Exsicc. n. 46.

Jungermannia pallens, SCHREANK, Syst. Samol. II. p. 7. HOFFMANN, Germ. II. p. 87. ROTH, Germ. III. p. 394.

Lichenastrum trichomanoides aquaticum odoratum fontis S. Winifride, HALL Syn. p. 113.

Hypotrachea polytricha facta, Musci trichomanoides, foliis rotundioribus, pallidis, aquam motam conjunctim sibi incumbentibus. VAILLANT, Bot. Par. tab. XIX. f. 7.

Jungermannia major, foliis brevioribus, et obtusioribus, non dentatis. MICH. Nov. Gen. p. 8. t. 5. f. 3.

Lichenastrum Trichomanis facta, polyanthum, breve et repens. DILL. Musc. t. 70. f. 9.

Lichenastrum Trichomanis facta, a basi et medio florans. DILL. Musc. t. 70. f. 7.

Lichenastrum trichomanoides aquaticum odoratum fontis S. Winifride, DILL. Musc. t. 70. f. 8.

Jungermannia foliis pinnatis, ovatis, ex caule florifera. HALL. Helv. III. p. 60.

HAB. Moist and very wet places in various parts of Great Britain. (It is particularly abundant upon rocks and stones in clear and rapid streamlets, producing fructification both male and female, in April and May).

(*J. polyanthus*.)

BRITISH JUNGERMANNIAE.

PLANT generally growing in rather loose and straggling patches, easily detached from its native soil. Roots more or less abundant upon different individuals, forming in small tufts from the under side of the

Stems, which are either wholly procremment, or at the apices only inclined to be ascending, filiform, flexuous, from one to two inches, or more, in length, simple, or once or twice irregularly branched, frequently also, producing innovations, which, at an advanced period, are scarcely to be distinguished from the branches themselves.

Leaves rather closely, but still alternately, placed in two rows, somewhat imbricating each other with their margins, horizontal in their direction, about half a line in length, but decreasing in size from the middle towards the base, as well as towards the extremity; of a nearly quadrate figure with the angles obtuse, their surface is plane, or but slightly convex, the base decurrent at the lower margin; the extremity entire in most instances, though often emarginate, especially upon the innovations, the notch varying from obtuse to acute. Once or twice I have observed a leaf to have two of these notches, thus forming a trilobed leaf, which, indeed, may have arisen from an accident. The *indure* is delicate, the cellular of a wood-like form the color, for the most part, a pale green, varying in intensity, in shaded and exposed situations.

Stipules (f. 5) of a narrow lanceolate form, divided nearly down to the base, into two entire, subulate, strict segments. Under a microscope they exhibit the common reticulated appearance of the leaves, which they further resemble in their color.

Perigynal leaves mostly situated at the extremity of the plant, eight or ten, or more, in number, resembling the cauline ones in every thing, except in having their base swollen for the reception of the Anthers (f. 8).

Perianthial leaves (f. f. 9, 10) very small, ovate, obtuse, unequally serrated at their margins a few of these, rather resembling scales than leaves, surround the base of the calyx, and are only seen upon the proper calycine stalk.

MALE FRUCTIFICATION in the axilla of the perigynal leaves.

The Anthers are spherical, reticulated, of a pale greenish or olive color, situated upon short whitish footstalks.

FEMALE FRUCTIFICATION upon short proper footstalks, resembling small ramuli, which originate from the under side of the plant, and, from a bent or curved base, become erect.

Calyx very short, scarcely half as long as the calyptra; at the base cylindrical, compressed towards the extremity, widely ovate, truncate, split into two lips, each of which is variously cut and laciniated at the margin. The lobes, it may be observed, are unequal; that on one side extending to about three-fourths of the length of the calyx, while the opposite one is scarcely half so deep (f. f. 9, 10).

Calyptra (f. 10) exerted, twice the length of the calyx, oblongo-obovate, white, membranaceous, semi-pilose, reticulated, lipped at the extremity with the short tubular style.

Podocarpis scarcely as much in length, white, cellular.

Capule ovate, approaching to subcircular, of a brown color marked with longitudinal and transverse furrows.

Seeds (f. 11) spherical both they and the spiral filiculae, which are composed of a double hull, are of a fulvous color.

BRITISH JUNGERMANNIÆ.

(*J. polyanthos*.)

When found in a state of fructification, there are, perhaps, few individuals of the genus that may be so readily distinguished as the present, its exserted corolla, and its truncate and bilabiate calyx, affording characters no less decisive than remarkable. The leaves, also, seem very constantly to retain their subquadrate form, and, though they may in some instances be as much emarginate as those of *J. heterophylla*, yet still their general figure, and their being so much more frequently entire, furnish sufficient marks of discrimination. In addition to this, it may be further remarked, that the stipules, which in *J. heterophylla* are much lacinated, are in *J. polyanthos* always entire.

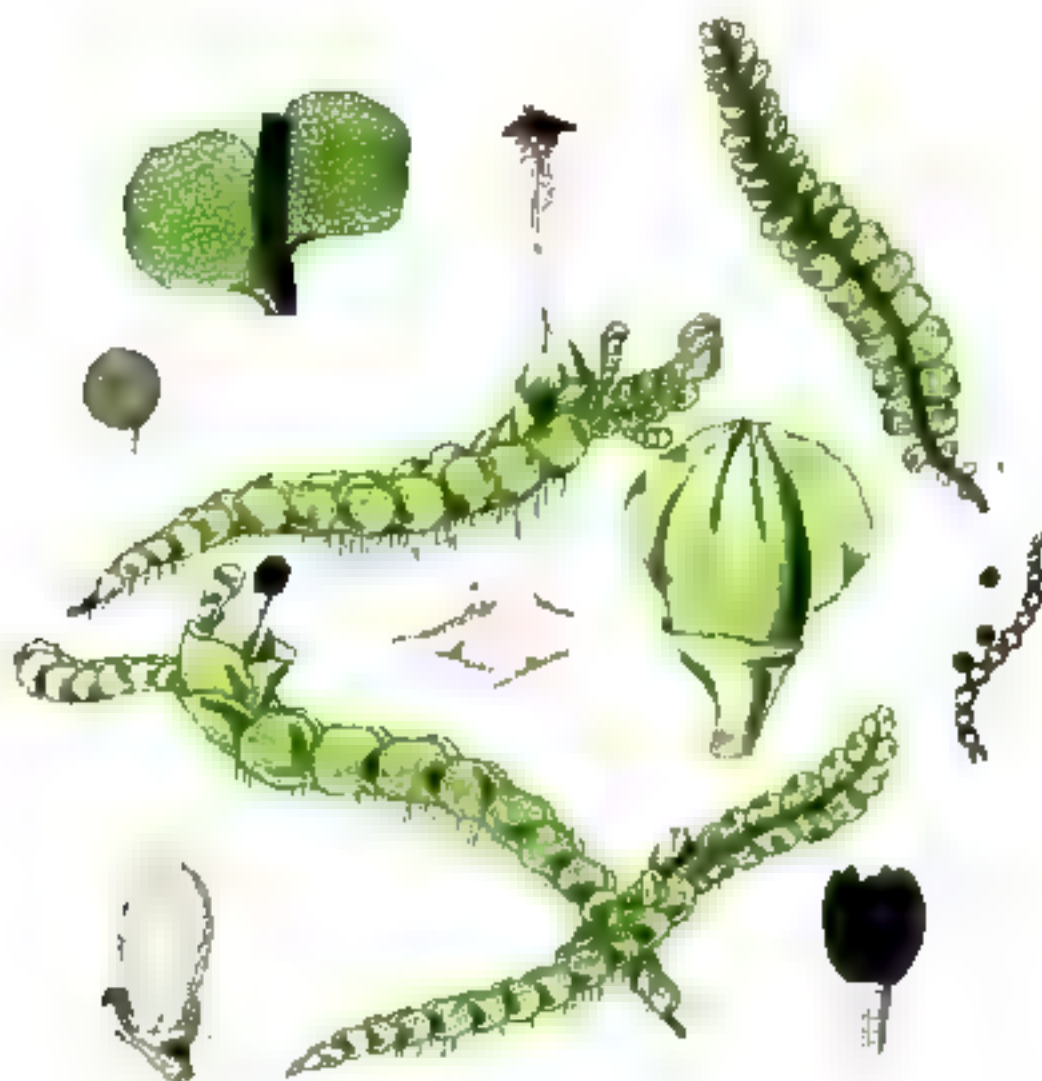
The Michelian figure above referred to is a tolerably accurate representation of our plant, indeed much more so, as it appears to me, than that cited by Dillenius (t. 5. f. 5). which I have consequently omitted. The author last mentioned, if I may be allowed to judge from his own specimens, has described this species no less than three separate times in his *Species Muscorum*. Of these his t. 63. f. 7 has always, though incorrectly, been regarded as *J. ruficulus*. The figure of Vaillant, bad as it is, bears a greater resemblance to the plant in question, than to *J. aspiensander*, under which species it has, in the writings of most Cryptogamists, found a place. Weis and Pollich, and even Linnaeus himself, have been singularly unsuccessful in their description of this species; nor does the fructification appear to be any where described with accuracy, till Schmidel published his valuable "*Dissertationes*," whence Roth seems to have drawn his characters. Schrader's *J. polioscens*, specimens of which have been communicated by the author himself to Mr. Turner, proves to be in no respect different from *J. polyanthos*.

REFERENCES TO THE PLATE.

FIG.

1.	<i>J. polyanthos</i> , male and female, natural size.	
2.	The same, magnified ..	8
3.	Portion of the stem with its leaves, seen from beneath, in order to show its stipules, ..	4
4.	Leaf ..	
5.	Stipule ..	3
6.	Perigonial leaf, with its Anthers ..	2
7.	8. Anthers ..	4
9.	Calyx and corolla ..	1
10.	Calyx ..	4
11.	Seeds and spiral filaments ..	1





Jungermannia, hyalina

JUNGERMANNIA HYALINA.

(TAB. LXIII.)

JUNGERMANNIA, caule ascendente, teretibus, dichotomis foliis erecto-patentibus, rotundatis, undulatis fructu terminali; calycibus ovatis, angulatis; ore contracto, quadridentato.

Jungermannia hyalina. LYELL, M. S. S.

HAB. Boggy places in the New Forest, Hants.; and among the rocks immediately above Stock-gill Force, a waterfall near Ambleside. *Mr. Lyell*.—Saling mountain, near Dublin. *Dr. Taylor*.—(It bears fruit in the early spring months.)

PLANT forming broad tails of a deep green —if unexamined, it might be easily passed by as *J. undulata* in a dwarf state, though its shining and glassy appearance is likely to attract the eye of the Botanist, who is at all conversant with the genus.

Roots dense, simple, pellucid fibres, proceeding generally from the whole length of the under side of the stem, which latter, as well as the roots, is of a deep purple.

Stem either wholly procumbent, or, as is much more frequent, ascendent in the greater part of its length, simple, or much branched with innovations, so as to look dichotomous.

Leaves (f. 8) bifarious, rather distantly placed, erect or erecto-patent, loosely imbricated, round, embracing the stem, and in places often concealing it, their texture extremely thin, membranous, shining and subdiaphanous; the *cellules* round, the marginal row being largest; color a deep bright green.

Perigonal leaves (f. 8) situated near the extremity of the stem, undulata like the rest and differing in no respect, but in having a swollen or ventricose base.

The *Perichetial leaves* (f. 9), which sometimes extend far below the apex of the stem, enlarge upwards from their base, so as to be broadly ovate, and are also undulata.

MALE FRUCTIFICATION (f. 3) in the axilla of the perigonal leaves.

Anthers spherical, of a pale, olive-brown color, reticulated, placed upon a short white footstalk.

FEMALE FRUCTIFICATION (f. 6 & 9) terminal upon the stems.

Calyx (f. 9) ovate, broad at the base, bluntly angular, the mouth contracted, cut into four teeth.

(*J. hyalina*.)

BRITISH JUNGERMANNIÆ.

Calyptra (f. 10) ovate, membranaceous, reticulated, tipped with a short hollow style.

Peduncle a quarter or half an inch long, white, striated.

Capitate (f. f. 8. 11) ovate, broad, approaching to round, of a deep brown color, furrowed both longitudinally and transversely.

Seeds and spiral filaments (f. 12) chocolate colored; the former spherical, the latter composed of a double helix.

Obs. The texture of the leaves in *J. hyalina* is exactly similar to that in *J. cordifolia*, and their position and habit often bear great resemblance to those of that plant, but their figure never approaches to cordate. In general shape and position, they are by far more like the leaves of *J. scalaris*, as well in its plane as waved state; but in their texture nothing can be more different. The fruit is, strictly speaking, terminal, as in *J. penula*, a near, though diminutive, relation of our plant, as the bend in the stem, whenever the fruit appears lateral, indicates that it is seated between an older and a younger shoot, but calyces so placed, and also terminal ones, are observable nearly of the same age on the same plant. *Lycell's M. S.*

To the above excellent character and description of *J. hyalina*, for both of which I am indebted to my friend, Mr. Lycell, by whom they were made from fresh specimens, it is needless for me to add any thing, except my hearty concurrence in his opinion, that the plant is decidedly distinct from the species just mentioned, as well as from every other in the genus.

REFERENCES TO THE PLATE.

FIG.

1.	Male plant, natural size	
2.	Female plants, natural size.	
3.	Male plant, magnified.	5
4.	Anther	1
6. 6 7	Female plants, magnified	6
8.	Leaves	4
9.	Calyx, with perichætal leaf	3
10.	Calyptra	9
11.	Capitate, not yet open	8
12.	Seeds and spiral filaments	1



Jungermannia cuneifolia

JUNGERMANNIA CUNEIFOLIA.

(TAB. LXIV.)

Jungermannia, caulis repens, simplicis foliis subdistantibus, cuneiformibus, integerrimis, vel apice obtusiusculis emarginatis stipulis minutis, ovatis, acutis, bidentis.

HAB. Found growing parasitically upon *Jungermannia Tamarisci*, near Bantry, by Miss Hatcher.

Plant so minute as to resemble the filaments of a *Conferva*, rather than the stems of a *Jungermannia*, growing loosely clustered.

Roots consisting of a few small fibres, which proceed in tufts from the under side of the stem, and always at the base of a stipule.

Stems extremely slender, filiform, rarely exceeding half an inch in length, generally much smaller, and, as far as I have had the opportunity of observing, undivided, of a brownish color; when dry exceedingly fragile, *cellules* small and oblong.

Leaves (f. f. 4. 5. 6), throughout the whole length of the plant rather distantly placed, scarcely the eighth of a line long, patent or erect, of an exactly cuneiform figure, the base decurrent, the apex entire, or cut into a wide, but very shallow notch, the margin every where destitute of teeth or serratures. The *cellules* are roundish the *texture*, when dry, brittle the color, in all the specimens that I have seen, a dull reddish olive or brown.

Stipules (f. f. 5. 7, one to each pair of leaves, rather closely appressed to the under side of the stem, small, of an ovate form, divided for more than half its length, by an acute sinus, into two sharp segments. Its color and texture the same as in the leaves.

(*J. caseifolia*.)

BRITISH JUNGERMANNIÆ.

Of the present curious little plant no fructification has at present been found, nor indeed is it at all necessary for the distinguishing of the species, the leaves and stipules affording abundant characters by which it may be known from every other in the genus. Neither is it an easy task to determine to which it is most naturally allied. In the narrowed base of the leaves it has an affinity with *J. spinulosa* in size, colour, and texture, with *J. hysaraca* but the stipules require that it should be arranged in quite a different family, where there is none for which it can be mistaken.

REFERENCES TO THE PLATE.

FIG.

- | | |
|--|---|
| 1. <i>J. caseifolia</i> , natural size, growing upon <i>J. Tamarisci</i> . | |
| 2. Detached individuals, natural size, | |
| 3. Stems, magnified | 6 |
| 4. Portion of a stem, and lower | 4 |
| 5. The axis, showing the under side, with the stipules and roots. | 4 |
| 6. Stem and leaves | 2 |
| 7. Stipules | 2 |



Jungermannia ciliaris

JUNGERMANNIA CILIARIS.

(TAB. LXV.)

Jungermannia, caule procumbente, pinnatim ramoso: foliis bifurcatis imbricatis, valde convexis, inaequaliter lobatis; lobis lobulisque bipartitis, longe tenuioribus ciliatis stipulis subquadratis, inaequaliter lobatis, longioribus ciliatis: fructu laterali, calycibus obovatis, ore contracto, dentata.

- Jungermannia ciliaris*, LAM. Sp. Pl. p. 1601. Syst. Nat. ii. p. 706. Fl. Suec. p. 402. Fl. Lapp. p. 342. POLLOCK, Pol. iii. p. 197. LAMOUR., Herb. p. 251. ENCH. Beltr. ii. p. 142. OGDON, ENCH. Pl. Fl. Dan. p. 42. WILLD. Berol. p. 342. HORN. Germ. ii. p. 64. ROY, Germ. iii. p. 400. DICKS. Pl. Crypt. Fosc. ii. p. 14. WESS. and MORE, Crypt. p. 413 (8da WAND.) WAND. Lapp. p. 385. Engl. Bot. t. 2241.
Jungermannia pulcherrima, WESS., Spic. Fl. Goet. p. 161. SWARTZ, in Amer. Acad. x. p. 118. SWARTZ, in Act. Nov. Ups. iv. p. 244. HORN. Germ. ii. p. 83. LAMOUR., Encycl. Method. vii. p. 285. LAM. Syst. Nat. ed. Guss. ii. p. 1352. WIND. iii. p. 261. DICKS. Pl. Crypt. Fosc. i. p. 7.
Jungermannia Leersii, ROY, Germ. iii. p. 402.
Lachnum ciliare, pulchrum, villatum. DILL. Musc. t. 60. f. 3.

HAB. Among rocks and in heathy places, especially in subalpine countries, abundant.

PLANT growing in densely-matted, purplish-brown patches, of considerable size.

Stems, varying from one to two or three inches in length, procumbent, or rarely (and only, I believe, when growing among tall mosses) suberect, flexuose, filiform, about as thick as horse-hair, furnished, at rather distant intervals, with short, obtuse, patent, alternate pinnae, which are frequently simple, but at other times beset with one or two small pinnales. The color is a yellow-brown, varying to green in the younger shoots; the substance fragile when dry.

Leaves (l. 6) more or less densely-crowded, imbricating each other in a bifarious manner over the upper surface of the stem, about half a line long, and not sensibly smaller towards the apex of the stem and pinnae than in the other parts of the plant. They are of a roundish,

or subquadrate figure, distinctly divided into two, unequally-sized, conduplicate lobes, of which the upper one is the largest, very convex on its upper surface, and cleft, for about half its length, into two, rather acute segments; the lower lobe, which is nearly plane, and not more than one third of the size of the other, is in like manner divided into two lanceolate and acute segments. The whole are elegantly bordered with long, capillary, flexuose cilia, which I have, in two or three instances, observed to be forked, and which are, throughout their whole length (f. 5), jointed in the same manner as the filaments of a *Conferva*. The cellular of the leaves are roundish and closely placed. The color is, in sheltered places only, a brownish-green; in exposed situations a purplish-brown, generally deeper towards the extremities.

Stipules (f. 6) of a widely quadrate figure, broader than the stem, to which they are appressed; at the end unequally lobed, and there, as well as along the whole margin, bordered with closely-placed, long cilia, narrower than those of the leaves, in which, in other respects, they are similar.

Perichæcial leaves (f. f. 7. 8); of these two or three are placed at the base of each calyx, and closely appressed to it. They are widely ovate, cut into two or three unequal segments, and ciliated along their borders.

MALE FRUCTIFICATION at present unknown.

FEMALE FRUCTIFICATION lateral upon the pinnula, near the middle of which they are usually situated.

Calyx of a more thin and delicate texture than the leaves, of an obovate form, having the mouth small, much contracted, and beset with small unequal teeth (f. 9).

Germes (f. 9) ovate, style long.

Pistils (f. 10) numerous, surrounding the base of the germes, linear-lanceolate, expanded at the mouth, of a pale greyish color, streaked longitudinally and transversely with darker lines, and having also a few reddish streaks.

The *cupule* and *spinal filaments* I have not had the opportunity of seeing myself, and therefore have copied the description of them from Hoffmann, who describes the former as being ovate, approaching to round, of a deep brown color, and the latter, as well as the seeds, of a subfuscous color.

The present very elegant species, which is not only common in this country, and upon the continent of Europe, but has even been brought from Greenland, according to Dillenius, is likewise found at Kamchatka by Dr. Tilenius, and has been by him communicated, with some other well-known European species of *Jungermanniæ*, from that country, to Mr. Dawson Turner. Yet, abundant and general as it is, it was unknown to the botanical world till Dillenius figured and described it in his *Historia Muscorum*. The name of *ciliaris* was adopted by Linæus, who, from giving a wrong reference to Vallant and Dillenius, has led subsequent authors into an error, and has been the means, if not of causing Weber, Wets, Hudson, Lamarck and Withering, to mistake *J. temenifolia* for *J. ciliaris*, at least of leading them to confound the two species. For the descriptions of many of the above authors will apply equally to either.

BRITISH JUNGERMANNIÆ.

(*J. ciliaris*.)

The *J. pulcherrima* of Weber is precisely the same as the Linnæan *ciliaris*; and Mr. Dickson, who published it as a distinct species in the first Fasciculus of his *Plantæ Cryptogamicæ*, was afterwards aware of the mistake, and corrected it in the second part of the same work. Nor is the *J. Lævifolia* of Roth to be considered otherwise than as a synonym to the present plant, for the jointed cilia, which the author dwells so much upon, are no less distinctly apparent in *J. ciliaris*, and even in *J. tomentella*, and Hoffmann's figure of *J. ciliaris*, which is referred to as *J. Lævis*, is an admirable representation of the true *ciliaris*.

I have already, under my description of *J. tomentella*, pointed out the characters which distinguish that species from the present. The subject of the following plate, *J. Woodii*, which at first sight bears a considerable resemblance to it, is remarkably different in having the margins of the leaves lacinated, not ciliated, in its bifid stipules, and in the large and distantly-placed cellulæ of the leaves. Between the three species, there is a considerable natural affinity, and, in all of them, the upper lobe of the leaf is more or less bifid; but the true figure of the leaves and stipules of *J. ciliaris* is admirably described by Wahlenberg, in the following passage, which I am induced to quote, hoping it may tend to remove future doubts upon the subject. "*Poliorum lobus supremus seu dorsalis ceteris major est et magis integer, inferiores tam longè subtriangulati ac fere multipartiti, nigri a stipulis discernendi. Stipuli fere claudunt longitudinem foliorum sequent, oblongæ, multilobæ-fimbriatæ fimbriæ longè articulata.*"

REFERENCES TO THE PLATE.

PLATE.

1.	<i>J. ciliaris</i> , sterile shoots, natural size.	
2.	Fertile plants of the same, natural size.	
3.	Portion of a fertile plant, magnified	6
4.	Under side of a portion of the stem, with its leaves and stipule	4
5.	Portion of a leaf, to show the cellulæ and jointed appearance of the cilia.	1
6.	Stipule.	3
7.	Exterior perichætal leaf	2
8.	Interior perichætal leaf	9
9.	Calyx, not open	4
10.	Pistillum	1



Sangermannia Woodii 1

JUNGERMANNIA WOODSII.

(TAB. LXVI.)

JUNGERMANNIA, caule procumbente, bi-tripinnato foliis bifurcatis imbricatis, valde convexis, inaequaliter bilobis; lobis superioribus bipartitis, spinuloso-dentatis; inferioribus minutissimis, oblongis: stipulis magnis, ovatis, bipartitis, spinuloso-dentatis, basi utrinque calcareatis.

HAB. On the ascent of Mangerton from Cwm na Cappel, Ireland. *Mr. Joseph Woods.*—
Since found at the Devil's Punch Bowl, upon the same mountain; and in very great abundance at Brandon, by *Dr. Trepter*.

PLANT growing in large and rather densely-crowded patches.

Stems procumbent, from three to five, and even six inches, in length, considerably stouter in the larger plants than horse-hair, flexuose, filiform, once or twice dichotomous, beset throughout their whole length with rather distantly-placed, patent or recurved, acuminate pinnæ, which vary from an inch to an inch and a half, or more, in length, and are either simple, or again furnished with shorter pinnules. The color is a dirty brown: the texture compact, when dry very brittle.

Leaves (f. f. 4. 5) rather closely placed, from a quarter to half a line in length. In the extreme ramuli the largest are at the apex, in the rest they become gradually smaller towards the apices; every where they are imbricated over the upper surface of the stems and branches, and have a bifurcous direction. Their form is round or subquadrate, and composed of two very unequal conduplicate lobes, of which the upper one is the largest, convex above, divided, for about half its length, by an acute sinus, into two, ovate segments, which are beset at their margins with variously-sized, but generally large, spiniform teeth. The inferior lobe is exceedingly minute and oblong, with its margin nearly entire. The cristules of the leaf are of a reniform form, very distantly placed, resembling those of *J. Ternstro.* The color is a purplish brown, paler, and of a more dirty hue in the lower leaves.

(*J. Woodii*.)

BRITISH JUNGERMANNIÆ.

Stipula very large, considerably broader than the stem, widely ovate, cleft into two spinuloso-dentate segments, and, at the angles of the base, furnished with a reflexed tooth or spur († 6)

No FRUCTIFICATION, either MALE or FEMALE, has yet been discovered.

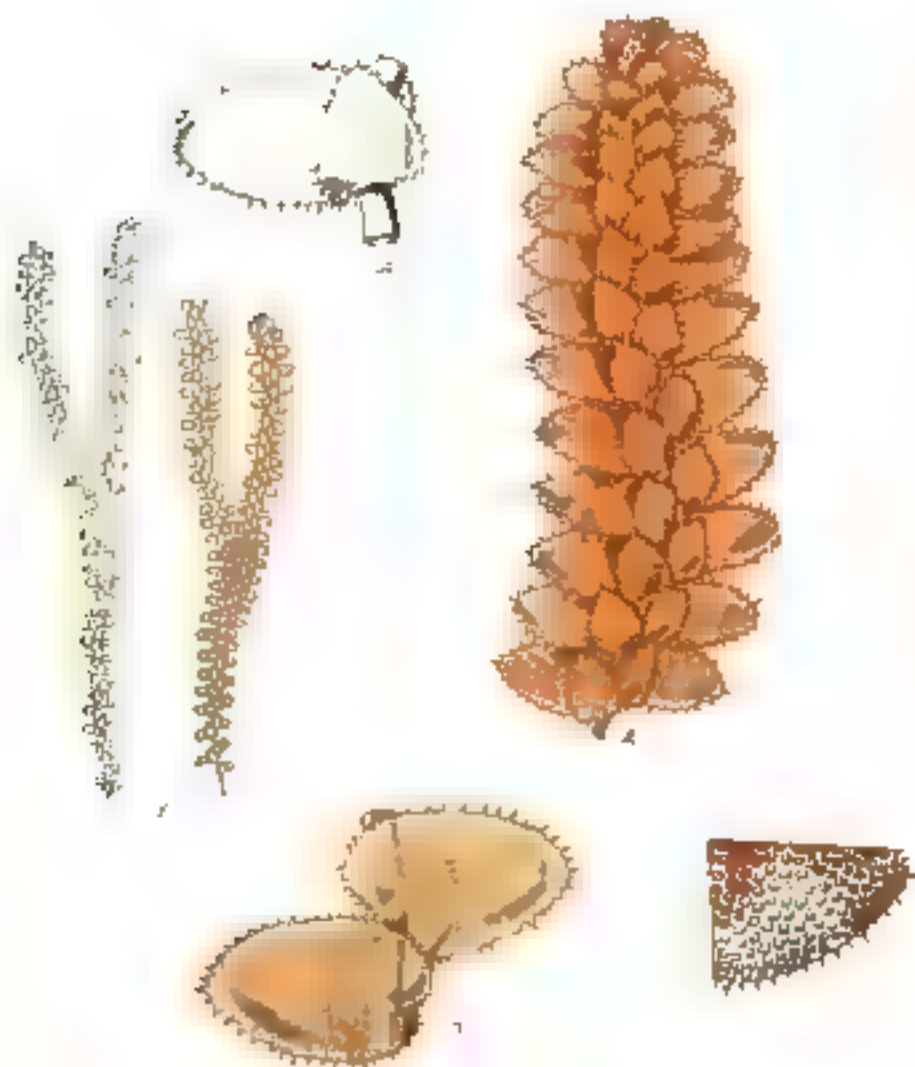
The truly magnificent specimen represented in the annexed plate, was detected in Ireland, in the year 1809, by my friend, Mr. Joseph Woods, to whose name I am desirous of dedicating it. It has since been found by Dr. Taylor, in the same country, and may possibly have been overlooked by other naturalists, for a variety of *J. ciliaris*, from which it differs in the size and ramification, as well as in the border of the leaves and stipules, in the extremely minute lobule of the former of these, and in the large size and very deep sinus of the latter. A farther and equally important mark of discrimination will be seen in the structure of the leaves, for the cellules in *J. ciliaris* are so closely situated, and the interstices consequently so narrow, that a beautifully reticulated appearance is afforded by them, whereas those of *J. Woodii* are widely placed, and at very unequal intervals, in the same manner as those of *J. jaspervina*, *J. Taylori*, *J. Turneri*, and a few others.

REFERENCES TO THE PLATE.

FIG.

1. *J. Woodii*, natural size.
2. *Extremity of the same*, magnified 6
3. *Portion of a stem, with its leaves, seen on the upper side*, 4
4. *Under side of a portion of the stem, with its leaves and stipules* 3
5. *Portion of the leaf, to exhibit the cellules* 1
6. *Stipule* 2





Jungermannia planifolia

JUNGERMANNIA PLANIFOLIA.

(TAB. LXVII.)

JUNGERMANNIA, caule erecto, subsimplex: foliis quadrifidis imbricatis, compresso-planis, inferioribus majoribus, ovatis; superioribus cordatis, omnibus elegantissime dentato-ciliatis.

Hab. Upon Ben na Bord, and upon Ben Mac Davie, a mountain to the north of the Dee.
Mr George Donn, 1812.—*Summit of Brandon. Dr Taylor*, 1813.

Plant growing in rather closely-crowded patches of a remarkably dingy brown color, always intermixed with mosses and other *Jungermannia*.

Roots, a few short brownish fibres, issuing principally from the lower part of the plant.

Stems erect, from two to three inches long, and about the thickness of packthread, flexuose, filiform, for the most part simple, but now and then forked: their color dark brown: their texture compact, rigid, and brittle.

Leaves (f 9) truly quadrifarious in their insertion, and imbricated on both sides of the stem, those at the back of it the largest, a line in length, plane, distichous, vertical, of a widely ovate figure, the superior leaves scarcely half so large as the rest, and obliquely appressed to them; their form nearly cordate: the whole are beautifully dentato-ciliate at their margins, of a rather dark brown color, sometimes inclining to purple towards the extremity. The *cellules* (f 5) are very minute, but somewhat distantly placed, and frequently of a paler color than the interstices: the texture thin, membranaceous; when dry, brittle, like the stem.

Fructification totally unknown.

(*J. planifolia*.)

BRITISH JUNGERMANNIÆ.

The remarkable insertion and direction of the leaves so well distinguish the present from every known British species of Jungermannia, that it would be superfluous to say any thing more upon the subject, were it not for the great similarity which it bears at first sight to *J. verrucosa*. My acute friend, Dr Taylor, first pointed out to me the real structure of the leaves, and ascertained them to be totally different from those of the species that belong to the section of the genus, "*foliis unequaliter bilobis*," the apparent lobe and lobule being in reality distinct leaves, as well in regard to their insertion, as to their figure; and in both respects bearing no inconsiderable resemblance to the *Hookeria quadrifaria* of Dr. Smith.

Mr. Donn first discovered this species, intermixed with *J. Doniana*.

REFERENCES TO THE PLATE

FIG.

- | | | |
|----|---|---|
| 1 | <i>J. planifolia</i> , natural size. | |
| 2. | Portion of the soma, magnified | 3 |
| 3. | Posterior view of a portion of the stem and leaves .. . | 4 |
| 4. | Anterior view of a portion of the stem and leaves .. . | 4 |
| 5. | Portion of the leaf .. . | 2 |
-





Jungermannia cochleariformis

BRITISH JUNGERMANNIÆ.

(*J. cochleariformis*.)

JUNGERMANNIA COCHLEARIFORMIS.

(TAB. LXVIII.)

JUNGERMANNIA, caule procumbente, subteroplice foliis ovatis imbricatis, convexis, ovato-rotundatis; apice bifida serratisque; basi rubris muculatis; auriculis magnis, oblongis, ovatis, inflatis.

Jungermannia cochleariformis WASS., *Pl. Crypt.* p. 123. WESSER, *Spic. Fl. Gort.* p. 145.

ROSE, *Germ.* iii. p. 392. SWARTZ, in *Act. Nov. Ups.* iv. p. 241. LINN. *Syst. Nat.* ed. Gmel. ii. p. 1350. *Engl. Bot.* t. 9500.

Jungermannia purpurea. SCOROLI, *Carm.* i. p. 347. LIONTF. *Scot.* i. p. 77B.

Novum Jungermannia. LINN. *Sp. Pl.* p. 1579. *Syst. Nat.* ii. p. 701. HORT. *Angl.* p. 473.

Lichenastrum Trichomanis furis, prolongum foliis concavis suam partem spectantibus. RAR. *Syn.* p. 119.

Lichenastrum alpinum purpureum. foliis ovatis cochleariformibus. DILL. *Musc.* i. 62. f. 3. c. b. e.

Jungermannia foliis amplexicaulis subrotundis HALL. *Hebr.* iii. p. 58†

HAB. Mountainous bogs in Ireland, and the north of Scotland, not uncommon.—It is particularly abundant about Cape Wrath, at the north-western extremity of the county of Sutherland, mixed with *Arctia alpina*.

PLANT growing in large, but loosely-entangled patches of many inches in diameter.

Stems, in their natural state, procumbent, but, when the plants grow thickly crowded or intermingled with tall mosses, not unfrequently erect. In length, they vary from four to six inches, and are about as thick as common packthread, smooth, simple, or here and there beset with a small undivided innovation which, for the most part, occurs towards the extremity. The color is a yellowish brown. The texture rigid, and brittle when dry.

Leaves very closely placed, and imbricated alternately, and with much regularity over the whole upper surface of the stem, so that they altogether conceal it. They are remarkably convex, distichous, with their apices incurved and looking one way († 3), as do the whole of the leaves occasionally in the fresh plant, and always in the dried ones, in which state the points of the leaves meet each other, and cover the auricles. The figure of the leaves is round, or approaching to ovate; at the upper margin, near its insertion upon the

stems, furnished with one or two rather large and spiniform processes or teeth, and, at the extremity, divided by an acute sinus into two serrated lobes. At the lower base of the leaf, and on the under side of the stem, is the auricle, an ovate, inflated, pouchlike appendage, about one-fourth of the size of the leaf, which it exactly resembles in texture, both having extremely minute, yet distinctly-placed, tubules (f. b). The color of the leaves is a fine purple towards the extremity of the plant, but becoming browner as it approaches the base, that of the auricles a greenish brown.

The FRUCTIFICATION is altogether unknown to me.

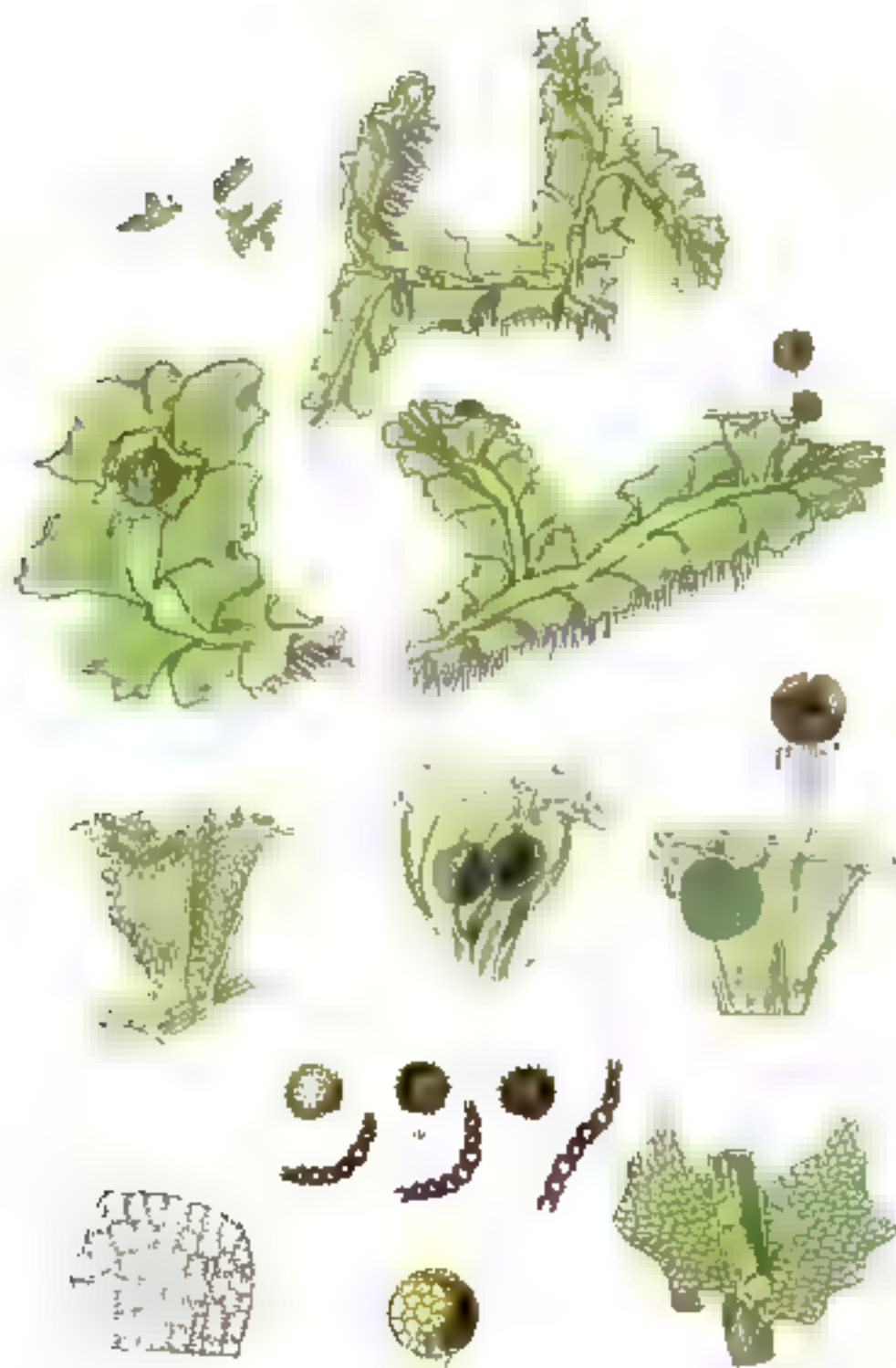
The Linnean *Moss Jungermannia* is, in all probability, the same as the plant here represented, which has, nevertheless, no affinity with the plant referred to in Mitchell's *Novæ Generis Plantarum*, by the illustrious Swede, under that species, that, as I have already had occasion to observe, being nothing more than a purple variety of *J. nemorosa*. Ray's plant is surely the same as ours, and Dillenius' figure is too accurate to be mistaken, although I did not observe the species in his herbarium at Oxford. The Hallerian synonym I can quote but doubtfully; but Weiss, who first adopted the name of "*cochleariformis*," has described the species with considerable accuracy. Neither this, however, nor any other author, seems to have been acquainted with the fructification, unless, indeed, Weber may be supposed to have been so, who still merely says of the plant, that "*Moss mosca profert vaginas terminales, serratæ concoloræ, cylindricas.*"

Dr Smith has made a remark upon *J. cochleariformis*, which I have not been able to verify by my own observation, that "the younger plants have flatter leaves, and are without the auricles." On the contrary, in all the specimens that have fallen under my observation, the leaves have been very convex, and the auricles sufficiently conspicuous.

REFERENCES TO THE PLATE.

FIG.

- | | | |
|----|--|---|
| 1. | <i>J. cochleariformis</i> , natural size. | |
| 2. | Portion, magnified | 6 |
| 3. | Under side of a portion of the stem and leaves . . . | 4 |
| 4. | Leaf and auricle | 3 |
| 5. | Portion of a leaf | 1 |



Jugermannia pusilla

JUNGERMANNIA PUSILLA.

(TAB. LXIX.)

Jungermannia, caule prostrato, subimplexo foliis horizontalibus, quadratis, undulatis, obtusis
crenatis. Fructu terminali calycibus campanulatis.

Jungermannia pusilla. LINN. Sp. Pl. p. 1002. Syst. Nat. i. p. 707. Fl. Suec. p. 404.
WILLD. Crypt. p. 117. WAGNER. Spicil. Fl. Goet. p. 10. FOLLICH. Polat. iii. p. 203.
GAUDEN. Enum. Pl. Fl. Dan. p. 45. HERWIG. Th. p. 80. t. 18. f. 49-52. SCHUMBL.
Icones. p. 32. t. 23. LAMARCK. Encycl. Bot. p. 294. JUNGEMANN. Germ. i. p. 99.
KORTZ. Germ. ii. p. 393. SCHUBERT. Spicil. p. 107. LAMARCK, Fl. Fr. ed. 2. iv.
p. 340. RICHARD. Cart. p. 410. HUBER. Arch. n. 5. 8. Engls. Bot. xxv. t. 1173.
Fl. Gall. p. 92. WAGNER et MOENCH. Fl. Crypt. Germ. p. 429. SCHUMBLER. Hist. Musc. Hepat.
Frond. p. 42.

Jungermannia angulosa. DICKS. Plant. Crypt. Foss. i. p. 1. WILD. ed. 4. i. 1. p. 815.
LINN. Syst. Nat. ed. Smol. ii. p. 1319. LAMARCK. Encycl. i. p. 290.

Jungermannia pygmaea. WILSON et SCHUB. Berl. Naturf. B. i. p. 101. 102. (fide MOENCH.)

Lichenostroma minutum var. *repitella nigra, laetida*. RAB. Syn. p. 340.

Jungermannia foliis latiusculis obtusis undulatis, et pediculis angulatis. MICHX. Nov. Gen.
Pl. p. 1. t. 6. f. 10.

Lichenostroma pinus var. *obtusis crenatis, nervis geniculatis*. DILL. Musc. i. 71. f. 23. c. n. 1.

Lichenostroma exiguum var. *repitella nigra laetida, a calycibus parvis campanulatis*. DILL. Musc.
i. 74. f. 40.

HAB. Moist, shady banks, especially on a clayey soil, where it is not of unfrequent
occurrence, bearing its fructification from October to the end of the spring.

The PLANT grows either in detached individuals, or thickly matted together so as to form patches
of many inches in diameter, and firmly adhering to the ground by its

Roots which are long, denser, simple, issuing from the whole length of the under side of
the stem, and of a remarkably deep purple color.

Stems wholly procumbent, lying flat upon the ground, varying from one to three, or sometimes four lines, in length; the diameter thick in proportion to the size of the plant, cylindrical, or somewhat compressed, wavy, simple (f. 5), beset with a single ramulus (f. 7), or, more rarely, divided once or twice in a dichotomous manner.

Leaves varying in number, according to the size of the individual, about half a line long, closely placed, obliquely decurrent, horizontal, of a squarish figure, much wavy, but scarcely plicate, the extremity cut into two, three, or four irregular and obtuse notches, forming segments, which are sometimes blunt and sometimes acute. Their color is a pale green, with more or less of a yellowish brown tinge as they approach the base of the stem; sometimes, according to Schmidt, partaking of a reddish hue. The *cellulæ* are roundish, approaching to ovate (f. 4).

There are neither perigastal nor peristomatous leaves* in this species.

The **MALE FRUCTIFICATION** (f. f. 3, 4) is scattered about the upper surface of the stem, and quite exserted, both upon sterile and upon cupuliferous plants. Each

strobilus is of a spherical form, reticulated, of a yellow color, terminating a white, pellucid, footstalk, which scarcely exceeds it in length (f. 5).

Female Fructification originating from the centre, or towards the extremity of the plant, but I have never observed it to be exactly terminal, although Dr. Roth considers that to be its true situation, and is of opinion that, when it is lateral, it arises from an "innævatio caulis."

Calyx produced singly, or two or three together, large, three-fourths of a line in length, sometimes nearly equalling the whole size of the plant, campanulate, having a cleft in the margin (f. 10) and the border variously crenate and wavy. At the base are five minute subulate stipuleiform processes, which have been hitherto unobserved by botanists, but which I find very constant in all the individuals I have examined. Sometimes the calyx is cut into three or four unequal segments, as is represented at figure 9. In the reticulation it resembles the leaves, as well as in texture except that it is somewhat more delicate. Its color is, moreover, paler, and not unfrequently, according to the acute Schmidt, of a reddish or pinky cast.

Germs of an obovate form. Two or three are sometimes contained in the same calyx (f. f. 6, 10, and 7).

Calyptra whitish, delicate, reticulated, terminated by a short style.

Peduncle scarcely twice the length of the calyx, of a silvery white, succulent, cellular, sometimes a little twisted (f. 10).

Capsule exactly spherical, of a reddish brown color, and of a thin, delicate, semipellucid nature, reticulated, having deep brown dots along the margins of the reticulations (f. 11); departing from the essential character of the genus, however, as it bursts in a most irregular manner †, to permit the discharge of the seeds, as may be seen at figures 10, 6, and 7.

* Yet Roth says of the fructification, that it is "*rarius hinc folia quædam haurit.*"

† Schmidt, I ought in justice to observe, expressly says, "*valva recedente dehiscens oblongæ ævæ ac acutæ formæ, cum intus hinc fortissimè non valvæ, sed ab invicem ab apice mucosæ et per particulas melleæ incipiens.*" and his fig. 17 represents the four entire valves. Yet, in the specimens which have come under my own observation, the capsules burst, as shown in the plate, thus irregularly.

Seeds spherical, numerous, of a rich brown color, rough, and with prominent points or tubercles. The spiral filaments are short, composed of a double helix. A few of them remain, Schmidt says, after the dispersion of the seeds, attached to the bottom of the capsule in the form of a tuft or pencil.

What the "seeds" may be, "in racemose disposita per ramulorum longitudinem," figured and described by Micheli on this species, I am at a loss to determine. The conjecture of Schmidt is probably just, that they are some parasitic fungus, and of Mohr, that they may be some species either of *Monilia* or *Botrya*. The curious bodies which Schmidt himself has taken for the male fructification of this species, have unhappily, altogether, escaped my notice, but his description is worthy of attention, and I shall offer no apology for the length of the following extract, though I cannot help expressing my regret at being unable to throw any additional light upon the subject: "Inter septemta punctum, he says, "ant oem qum incompleta est, aliquot nacula occurrunt inter aliquot cavities, sed plerumque aliqui callos specie instructi sunt. In medio callos anula, minime, insensibilis, vesiculæ et hinc et inde rugulæ latissimæ, quæ globulorum latera modè circumstant, modè circumstant, et plerumque cum globulis ipsis rursus circumstant, uno alterove forte distans restant. Superficie globulorum latera tuberculis incerti numeri, decem aut pluribus, aliquantulum polliculis inæqualis est, et paries totus ex vespulis minutissimis rotundis conficitur, quæ hinc tumens augens detrahens detegit. Disiecti globuli vesiculæ succum traxit coloris nati copiosum includentes prominent, hinc et inde quid, setinæ allicujus generis aut formæ minutissimæ persistent, adeoque eo respectu satis declarant, quod organi masculini et Antheriorum vices explent." It will, however, as soon be seen that these supposed "Organi masculini" are very different from the Anthers in the mosses, which, in every respect, resemble those in other species of the genus, and differ in nothing from what are represented by Hedwig, except in color, and this, probably, varies in different stages of their existence.

With regard to the affinities of this species, I know of none to which it is at all naturally allied, and, indeed, its extremely delicate texture and the manner in which it grows, are almost sufficient to afford characters for its separation from the rest of the genus, did not the habit of the plant forbid it. In the calyx, two remarkable peculiarities may be observed, in the widely-expanded mouth, and the stipulaceous protheca, or the bractes, as they might be called, at the base. The situation, too, of the fructification is very curious, unaccompanied by perigonal or perichætal leaves, and the whole plant diffuses an agreeable odor, not unlike that of the sweet sage, *divina Calceolæ*.

The crimped leaves of this plant suggested to Schmidt the idea that it resembled a lettuce, for he says, "gregatim nascitur et propius inspecta minutum lactucæ crispum imitatur, quibus etiam Michælus assimilavit," and Roth, considering that this appearance was peculiar to the young plants, observes, "Pilea pusilla, in juniori statu crispum minutum, hinc vixit, crispum et, ut bene vocat Michælus, lactucæ crispæ simulum representat; proventum namque magis exornat frondes et evolvuntur."

(*J. pusilla*.)

BRITISH JUNGERMANNIÆ.

In my *Tour in Iceland*, ed. 2, p. 161, I have mentioned having found this plant in a most flourishing state, although always exposed to the vapor of boiling water. Indeed, it was the only spot on that island where I recollect to have seen it; nor does it appear, from Wahlenberg's *Flora Laponica*, that it is at all a native of that country. In the warmer parts of France and Switzerland, and in the north of Italy, it is far more common than in England.

REFERENCES TO THE PLATE.

FIG.

1, 2. Male and female plants, natural size.		
3. Male plant, magnified	"	6
4. Portion of a male plant, with its anthers	"	2
5. Anther	"	1
6. Female plant, with one calyx	"	6
7. Female plant, with two calyxes	"	6
8. Calyx	"	3
9. Calyx, cut into segments	"	3
10. Calyx, with capsule bursting.	"	3
11. Portion of the capsule	"	1
12. Seeds and spiral filaments	"	1



Jungermannia barbata

JUNGERMANNIA BARBATA.

(TAB. LXX.)

JUNGERMANNIA, caule procumbente, simpliciusculo foliis rotundato-quadratis, 3 vel 4-fidis; stipulis lanceolatis, acutè bifidis, marginibus laciniatis fructu terminati; calycibus ovatis, ore contracto, dentatis.

- Jungermannia barbata*. SCHREBER, *Spica Fl. Lipt.* p. 107. SCHMIDT, *Icænes* p. 107. *Dissert. de Jung. Char.* p. 20. SCHNABER, *Samm.* n. p. 8. *Spicil. Fl. Germ.* p. 74. HORT. *Germ.* 1. p. 89. ROY, *Germ.* III. p. 352. LINN. *Syst. Nat. ed. Gmel.* II. p. 1360. LAMARCK, *Fl. Fr. ed. 2. n.* p. 29. *Fl. Gall.* p. 92.
- Jungermannia quinquedentata*. HUDS. *Aspl.* p. 513. LINN. *Sp. Pl. n.* p. 1598. *Syst. Nat. n.* p. 705. SCHREBER, *Botar.* I. p. 496. FOLL. CH. *Pol. n.* p. 183. *Essen. Pl. Fl. Dan.* p. 41. LEARI, *Herb.* p. 250. VILLARS, *Delph.* I. p. 924. WAGNER, *Spicil. Fl. Germ.* p. 137. ROY, *Germ.* III. p. 383. WITT. *ed. 4. n.* p. 853. LINN. *Syst. Nat. ed. Gmel.* I. p. 1349. LACINZ, *Scot.* II. p. 773. LAMARCK, *Enchir. Bot.* III. p. 280. *Engl. Bot.* t. 2512. WAGNER & MONT. *Fl. Crypt. Germ.* p. 430. SCHWABER, *Hist. Musc. Hepat. Prodr.* p. 29. WAGN. *Fl. Lapp.* p. 395.
- Jungermannia Friesii*. WAGNER & MONT. *Fl. Crypt. Germ.* p. 410. WAGN. *Fl. Lapp.* p. 389. *Fri.*, *fide MONT.*
- Jungermannia dihetoma*. SCHREBER, *Cent.* 2. n. 571. et
- Jungermannia gracilis*. Fj. *Cent.* 3. n. 60.
- Jungermannia tridentata*. SCHREBER.
- Jungermannia quadridentata*. WOLF. in SCHREBER, *Berl. Naturf. 2.* 1. p. 164.
- Lichenastrum Trichomanis facta*, foliis multifidis, capitulis e summis ramulis nascentibus. BAI. *Syn.* p. 213.
- Jungermannia alpina*, foliis subtriangulis, latiusculis, angulosis. MICHAELI, *Nov. Gen.* p. 8. t. II. f. 11.
- Lichenastrum pinnulla obtusè trifida*, nervo geniculato. DILL. *Musc.* I. 71. f. 22.
- Lichenastrum multifidum majus*, ab extremitate florens. DILL. *Musc.* I. 71. f. 23.

β. minor, caule sæpè elongato, adscendente foliis inferioribus petalis; superioribus arcuatis imbricatis gemmiferis.

(*J. barbata*.)

BRITISH JUNGERMANNIE.

HAB. Subulpine countries upon rocks, in woods and heathy places, abundant.—*Var* β was discovered by the *Rev* A. B. Francis, growing among *Dicranum glaucum*, in Hult wood, and has since been found by *Mrs* Hutchins so imbrided among mosses and tufts of *J. nemorosum* that only the tops of the shoots appear. *Dr* Taylor likewise finds it near Dublin, and *Mr* Lyell at Kinnordy.—(The male fructification exists throughout the year the female, which is far less common, is produced in the spring months.)

PLANT growing in more or less densely crowded patches, and of various dimensions.

Roots abundant. often clothing the whole under side of the stem, consisting of caudate, simple, brownish fibres.

Stems from one to two, or three inches long: never (I believe) really branched, but here and there producing simple innovations, which have sometimes the appearance of divided stems, flexuose, bifurcate, villulose, of a greenish color inclining to brown in older specimens.

Leaves varying much in the closeness of their position: sometimes they are densely imbricated, at other times, distinctly placed, half an inch long: distichous, alternate, patent or erect, of a subquadrate figure, slightly decurrent at the base, at the extremity divided into generally three, but sometimes only two, or often four large, triangular teeth; not always, indeed, of equal size, for the inferior one (which is nearest the base of the plant) is usually the smallest, and frequently incurved, or even emarginate, while the rest are expanded: they are entire, most acute and diaphanous at the apex (*f* 8), sometimes acuminate, or even spiniform, and sometimes, especially in the *var* β , obtuse. Besides these large teeth or segments, there is a very minute one situated at the base of the upper margin of the leaf near its insertion on the stem (*f* 1 to 11 12). The color, too, is remarkably variable, depending much on the more or less exposed place of growth of the individuals. Most usually τ is a pale, sometimes a bluish, green. In our β , brownish. The villules (*f* 11) are somewhat of a roundish form.

Of the stipules there is one to each pair of leaves, which varies considerably in size upon different specimens. It is always of a widely lanceolate figure, divided for more than three-fourths of the way into two narrow acuminate segments, which, on their margins, are again cut into variously-sized teeth or laciniae. In texture and color it resembles the leaves.

The perigynial leaves (*f* 1. 4. 5) are crowded together at the extremity of a stem, and scarcely differ from the common cauline ones, except in being more convex, and in having a swollen or ventricose base.

Of the perichetial ones, three or four surround the base of the calyx: their figure is subtriangl, concave in the middle, at the apex quadrifid, with the segments very sharp; near the base, on one side, is a small spiniform tooth (*f* 13).

Male Fructification in the axilla of the perigynial leaves.

Anthers of an ovato-spherical form, of a grayish color, slightly reticulate. **Footstalks** short, whitish, villulose.

Female Fructification terminal, but frequently appearing lateral from the "innovation caulis" just beyond it.

The calyx, before it has acquired the length of the perichetial leaves, is nearly spherical, then ovate, or rather obovate (*f* 6), plicated upward, the middle contracted, and sharply, but irregularly, toothed.

BRITISH JUNGERMANNIÆ.

(*J. barbata*.)

Calyptra ovate, delicate, reticulated, and tipped with a short tubular style.

Pedunculi numerous, lanceolate, a little swollen at the base, and slightly expanded at the mouth.

Pedicels from three-fourths of an inch to one inch in length, white, succulent, cellulose.

Capitate dark brown, ovate, approaching to spherical, opening into four, or sometimes, according to Schimper, three valves.

Seeds and *spiral filaments* deep fulvous brown. The former spherical, the latter formed of a double *filix*.

Gemmae are produced both on the common appearance of the plant, and more abundantly on the var. β . On the former, I have always observed them to be collected into small spherules (f. 16) in the latter, to be loosely scattered at the apices of the leaves. In both, they are of a roundish figure, bevel with sharp angles, of a greenish brown color, semipellucid.

My var. β (f. 18) is considerably smaller than α , rarely exceeding an inch in length, notwithstanding that the upper half is usually lengthened and ascendant. This part is covered with leaves so closely imbricated on each side of the stem, and appressed to it, as to conceal it altogether, and make it bear no inconsiderable resemblance to the shoot of *J. communis* while the lower leaves are patent, as in the common state of the plant. The leaves, however, throughout, are more concave, and the color much browner. The uppermost leaves are notched, forming three, and sometimes only two, small teeth (f. f. 19 & 20). On these the *Gemmae* are situated. The leaves below them are frequently antheriferous. So small are the *stipules*, that they are with difficulty discoverable; and they will be found to be rather ovate than lanceolate, whilst the margins are nearly entire. Unfortunately, no *Fossils* *palustris* has been yet met with, by which it might be ascertained how far I have done right in making the present plant a variety of *J. barbata*, for it differs in many particulars, and I am not aware, that the common appearance of this species has ever been found in our flat parts of England, it being confined, as I have reason to think, to somewhat mountainous districts.

Notwithstanding that the figure 23 t. 71, of Dillenius has been generally quoted as the *J. barbata*. It is really intended, as well as figure 22 of the same plate, for the plant here described, if any dependence can be put in the specimens corresponding with those numbers in the Herbarium at Oxford. Micheli's representation of this species is particularly unsatisfactory (that of Schimper), in his *Prodr.*, as well as his elaborate description, are truly from the hands of a master, although he has fallen into the same error in common with the other botanists who have described this plant, all of whom (with the exception of Dillenius, have omitted to notice the *stipules*. I am much surprised that they should have escaped the acute researches of Wahlenberg and Mohr. These naturalists have, it is true, discovered them on what I consider to be the same species, the *J. flexilis*, for nothing can better correspond with our present species than the description of it in the *Flora Cryptogamica Germanica*. "*Filix inaequaliter tridentata, ceterum integerrima asphagnetis (sive stipulis) 2-partitis, lacinis subpinnatifidis.*" Yet, although Wahlenberg refers to Mohr's description, he has represented the plant as having simple *stipules*,

and one to each leaf, which is quite at variance with all we yet know respecting the stipules of *Jungermannia*. Dr. Smith, too, has described the stipules as entire.

J. barbata is abundantly distinguished from every other species of the genus, by the shape of its leaves, its stipules, and its calyx, when taken in conjunction with the other parts of the plant. Its nearest affinity is, perhaps, with *J. stipularia* and *J. Bonnierianus* Less., but these have only two teeth or segments to the leaves, and the stipules are undivided. In regard to the name, I have preferred that of Schreber, notwithstanding that *J. quinquefentata* is the oldest and has been sanctioned by the authority of Linnæus. This latter is extremely inapplicable, and can only tend to mislead the student, for, I believe that, except by accident or injury, five segments are never seen to exist on the leaves of this species.

REFERENCES TO THE PLATE.

[illegible]



Sangermannia crassidens

JUNGERMANNIA ORCADENSIS.

(TAB. LXXI.)

JUNGERMANNIA, caule erecto, simplicif. foliis arcuatis imbricatis, erectis vel patentibus, cordato-ovatis, apice emarginatis, marginibus recurvis.

HAB. Upon the *West Hill*, the highest mountain of Hoy, in the Orkneys; found near its summit, in 1808.—Ambleside, in Cumberland, and at Catlaw, Kinnordy, Scotland. Mr. Lyell.—Summit of Brandon. Dr Taylor

PLANT either growing in loosely-matted patches of a few inches in diameter, or, more frequently, scattered among mosses and other *Jungermanniæ*.

Roots consisting of dense, but short, simple, semipellucid fibres, which clothe the under surface of the plant.

Stems from one to two inches in length, erect, filiform, sericeous, simple, or only producing one or two innovations, and those generally towards the extremity of the plant.

Leaves closely placed and subimbricatis, scarcely half a line long, of a widely ovate figure, approaching to cordate, patent or erect and recurved, at the base semisamplexicaul and decurrent at the extremity, furnished with a rather deep and obtuse notch. The margins on each side of the leaf are recurved (f T) throughout the whole plant. The texture is compactly cellular, the *cellule* roundish. The color a brownish green.

No FRUCTIFICATION, either MALE or FEMALE, has yet been discovered; but

Grains are found by Mr. Lyell on his Kinnordy specimens, situated on the points of the terminal leaves. They are collected into compact balls or spherules, and each granule, of which they are composed, is pellucid, of a yellowish green color, remarkably angular (f. I. 7, 8).

Specimens of this plant, which I have lately gathered in various parts of the mountains of Savoy and Switzerland, agree in every respect with those of our own country: so that, although I have never yet had the good fortune to meet with its fructification, I venture to describe it as a new species, thinking myself fully justified in so doing by the constancy of the characters here laid down. At first sight, *J. arcadensis* might be mistaken for a variety of *J. barbata*; but it will soon be seen, that, in the present species, the stipules are wholly wanting, and that the leaves are never trifid. From *J. ventricosa* it differs in its larger size, in the small obtuse notch of the leaves, and in its erect mode of growth; and from that, and every species to which it is in other respects at all allied, by the curiously recurved margins of its leaves.

I have taken its name from the country in which it was first found.

REFERENCES TO THE PLATE.

FIG.

1, 2. <i>J. arcadensis</i> , natural size.			
3. Gemmiferous plant, magnified	..	.	6
4. Sterile plant, with innovations	.	.	6
5. Portion of the stem and leaves		+	4
6. Leaf	..	..	3
7. Leaf, with clusters of Gemmae	..	.	4
8. Gemmae	..	..	1



Jungermannia allouana

JUNGERMANNIA ALBESCENS

(TAB. LXXII)

Jungermannia, caule repente, ramoso: foliis distantibus, alternis valde concavis, prope modum hemisphericis, emarginatis; stipulis ovato-lanceolatis, obtusis.

HAB. Near the summit of Ben Nevis, Scotland.

PLANT growing in large, loosely-matted patches.

Stems half or three-fourths of an inch in length, creeping, waved, filiform, branched twice or thrice in a dichotomous manner, and attached to the ground by

Radicles, short, simple, and subpellicid, which descend in tufts from the under side of the plant, and particularly near the stipules.

Leaves rather distantly and alternately placed, very small, of a nearly hemispherical figure, their base semisamplexant, their apex furnished with a single obtuse notch, having its segments somewhat connivent. The texture is remarkably succulent; the *cellulæ* large and prominent, like those of *J. minutissima*, and its affinities. The color a pale green, becoming almost white when dry, which has induced me to adopt the name of *albescens*.

The *stipules* are distantly placed—one between each pair of leaves. It is nearly of the width of the stem; of an ovato-lanceolate figure, quite entire.

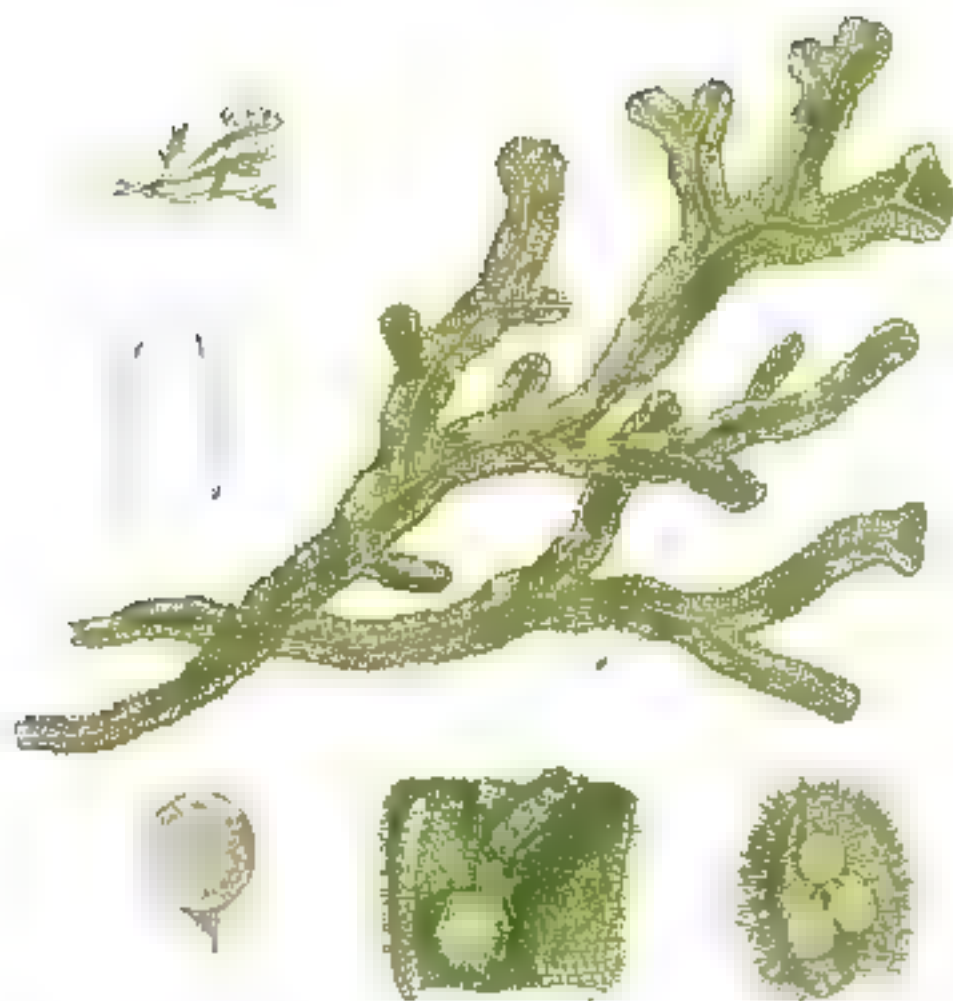
The only British specimens I possess of this plant, are destitute of fructification, and, unfortunately, those which I found in such profusion, bearing calyxes and capsules upon some of the loftiest of the Swiss Alps, are not arrived in this country; so that, however unwillingly, I must defer my figures and description of the rest of the plant, till the appearance of a supplementary number. Enough, however, is known of the species, to enable me to say, that I consider it one of the most decidedly marked in the genus, and that it will rank near *J. Francisci*, from which the much more copious leaves and entire stipules will always distinguish it.

REFERENCES TO THE PLATE.

FIG.

- | | | |
|----|---|---|
| 1. | <i>J. albertana</i> , natural size. | |
| 2. | The same, magnified | 8 |
| 3. | Portion of the stem, upper side | 4 |
| 4. | The same, seen beneath | 4 |
| 5. | Leaf | 1 |
| 6. | Stipula | 1 |

—



Sargassum muticum

JUNGERMANNIA PUBESCENS

(TAB. LXXIII.)

Jungermannia, *Frondis impressi*, dichotomi, membranacei, costis apicibus pubescentis

Jungermannia pubescens. SCHWAB, *Sober* p. 22. *Scrub* & *Samml.* t. p. 7. *Spic. Fl. Germ.* p. 76. *Lat. Fl. Pr. ed. 9.* p. 497. *Lat. Fl. Gall.* p. 9. *Bot. Germ.* t. p. 414. *Wexel et Munn.* *Fl. Crypt. Germ.* p. 436.

Jungermannia tomentosa. *Hort. Germ.* p. 61.

Jungermannia fuscata. *Lam. Herb.* p. 255. *Tenthred.* in *Linn. Trans.* t. p. 420.

HAB. In Ireland and Scotland, common on wet rocks in the alpine parts of England in similar situations it is also not rare.

PLANT covering rocks, sometimes in a considerable caemat, with pale, glaucous-green patches.

Fronds an inch or so inch and a half in length horizontally spreading and embracing each other very closely. Their width is scarcely more than half a line. They are divided in a dichotomous manner: twice or thrice the apices always obtuse, the ridges waved, canaliculate, the center furnished with a strong nerve or rib and the whole superficially, both above and below, and at the margins, covered with numerous short, white, pendulous, simple, jointed hairs, which give the plant a pubescent appearance. The *frondis* is delicate, the *costis* small and roundish but indistinct on account of the pubescence. The color is a pale green, rendered still paler by the white hairs.

Male Fructification arising most abundant on the under side of the plant and always attached to the mid rib. The

anthers are two or three in number, enclosed in a young, reniform frondis, spherical, of a pale brownish green color, terminating a short white *foveolus*. The *involutions*, on the decay of the anthers, appear to shoot out into perfect fronds, which, probably are detached from the parent plant and become new ones.

No Female Fructification has been discovered in this, nor, as far as can learn, in any other country.

I am far from considering it as certain that the above characters are sufficient to distinguish this plant specifically from *J. furcata*; since I can discover no difference but in the hairs, which in *J. pubescens* cover the whole plant, whilst in *J. furcata* they are either confined to the margins, or, at most, to that and the under side. Yet this difference appears to be very constant, and I have followed Mahr and Schrader in keeping the two separate.

REFERENCES TO THE PLATE.

fig.

1	<i>J. pubescens</i> , natural size.	
2	The same, magnified	6
3	Portion seen on the under side, with the Anther-bearing innovations	3
4	Section of an Anther, bearing innovation	2
5	Anther	1
6	Hair	1





Jungermannia sphaerocarpa

JUNGERMANNIA SPHÆROCARPA

(TAB. LXXIV.)

JUNGERMANNIA, caule adscendente, simplicis foliis orbiculatis calycibus oblongo-obovatis, cylindraceis, quadrifidis (capsula sphericâ.)

HAB. Cadogan bog. *Mr. Leyel*.—(in the neighborhood of Dublin. *Dr. Taylor*.—(It bears fruit early in spring.)

PLANTS growing in rather dense tufts of a pale green color.

Stems scarcely exceeding half an inch in length, ascending, filiform, waved, and, as far as I have yet seen, altogether simple, here and there, from their under side, throwing out small, simple, whitish, fibrous radicles.

Leaves rather distantly and bifurcately placed, in the barren shoots, smallest at the base, and at the extremity, in the fertile ones, largest towards the calyx; of an exactly orbiculate figure, a little concave and decurrent, mostly horizontally patent, but sometimes towards the apex of the plant erect. Their color a pale green. Their texture delicate reticulations small, roundish.

Perichaetial leaves generally more ovate, and always larger than the rest; otherwise the same.

FRUCTIFICATION MALE, unknown.

FRUCTIFICATION FEMALE always terminal.

Calyx oblong, inclining to obovate, having no angles, cut at the extremity into four large, acute teeth or segments. Color and texture nearly the same as those of the leaves.

Germen ovate, style rather long, tubular.

Calyptra ovate, reticulated.

Perianth twice or thrice the length of the calyx, white, pellucid, cellulose.

Capsule exactly spherical, brown, shining, splitting into four equal, widely ovate segments.

Seeds and spiral filaments deep fulvous brown, the former spherical, the latter short, and formed of a double helix.

Much as this species is allied in general habit, and in the foliage, to *J. scalaris* and *J. crenulata*, yet it may be at once distinguished when in fructification, from the former, by the exserted calyx, and from the latter, by this part being entirely free from angles, and by the four large teeth at its extremity. In the remarkably spherical shape of the capsule, it differs from both, and equally from *J. pumila*, which is moreover a much smaller plant, and has the calyx acuminate, plicate, and toothed, not quadrid.

We are indebted to Mr Lyell for our first knowledge of this plant, which Dr. Taylor soon after discovered in Ireland.

REFERENCES TO THE PLATE.

FIG.

- | | |
|---|---|
| 1. <i>J. sphaerocarpa</i> , natural size. | |
| 2. Fertile plants, magnified | 6 |
| 3. A sterile plant | 6 |
| 4. A portion of the stem and leaves | 3 |
| 5. Calyx with the capsule unopened | 4 |
| 6. Section of the calyx, showing the German | 5 |
| 7. Capsule bursting and discharging its seeds | 2 |
| 8. Seeds and spiral filaments | 7 |





Jungermannia replans

JUNGERMANNIA REPTANS.

(TAB. LXXV.)

Jungermannia, caule repente, stramineo tomento: foliis superioribus imbricatis, subquadratis, incurvis, acutè quadridentatis: stipulis lato-quadratis, quadridentatis. Fructu radicali: calycibus oblongis, pilosis, ore dentatis.

Jungermannia reptans. Linn. Sp. Pl. p. 1590. Sp. Nat. ii. p. 706. Schaubert. Schumbl. i. p. 6. Wacc, Plant. Crypt. p. 119. Wurm. Spic. Fl. Goet. p. 144. Wurm. ad 3. p. 659. Hedw. Germ. p. 98. Rott. Germ. vi. p. 398. Schreb. Berol. i. p. 494. Schumbl., Spic. Fl. i. p. 106. Lapp. Herb. p. 251. Lapp. Pl. Fr. Dan. p. 42. Huds. Angl. p. 53. Lich. Sept. ii. p. 779. Schumbl., Icones p. 259 t. 68. Schumbl., Diss. f. 8—13. Linn. Syst. Nat. ed. Gmel. i. p. 1350. Linn. Encycl. Method. ii. p. 982. Engl. Bot. t. 608. Lam. Fl. Fr. ed. 2. ii. p. 433. Wurm. Lapp. p. 366. Wacc et Munt. Fl. Crypt. Germ. p. 41.

Jungermannia velina comata, polyantha, foliis imbricatis, trifidis. Hall. Hist. ii. p. 61. n. 1979.

Jungermannia foliis laciniatis ordinatis, undulatis et velis asperis. MICHX., Nov. Gen. p. 10. t. 6. f. 9.

Lichenastrum Trichomanes facie, foliis multifidis, copiosis et una confusis heteraneis. Rast. Syn. p. 113. n. 22.

Lichenastrum multifidum arigenum, ad basin ferens, per sordidum imbricatum. DILL. Musc. t. 71. f. 24.

β. pinnata ubique duplè major, ramis lappaceis.

HAB. Abundant in woods, on banks and shady places, in various parts of the Kingdom. *β* on the borders of Lough Beg, plentiful. *Sir Turner*.—found near Bentry, and in other parts of Ireland, by *Miss Hutchins*, *Dr Taylor*, and *Dr Stokes*.

PLANTS covering the soil in dense tufts, or, as frequently happens, growing more loose and struggling among mosses and other *Jungermanniae*.

Stems most numerous at the base of the plant, but also proceeding here and there from beneath the stipules on the under side of the shoots, in small tufts, composed of whitish, simple, peltate filices.

Stems creeping, horizontal, from half an inch to an inch and a half long, firm, glabrous, of a greenish, or, in older specimens, of a yellowish color; cellular, irregularly branched, growing in a sort of stellated manner, as in *J. bicuspida*, *J. hyemalis*, &c.; the branches beset with patent or horizontal simple planes. Sometimes the extremities of the shoots are of the same width as the rest, and obtuse; at other times, they are attenuated to a considerable length. From the under side of the stems, at somewhat distant, decussate *flagellae*, resembling, in a great measure, those of *J. arbutus*, and, like them, covered with foliaceous scales.

Leaves imbricated on the upper surface of the stems and branches, closely so for the most part; but, on the innovations and attenuated extremities of the branches, distant and very small: the rest are larger, all of them patent or horizontal yet pointing a little in the direction of the end of the branch, of a nearly quadrate figure, convex, and having the apices incurved, and divided into four or sometimes three, and occasionally five, acute teeth. Their color is a pale green, their reticulation small, the areolae distinctly placed in lines, and at tolerably equal distances, as in *J. Turneri*.

Perigonal leaves generally at the extremity of an "innocuous axis," more convex than the rest, and more closely imbricated (f. f. 2, 3).

Peristomial leaves, six or eight at the base of each calyx; the anterior ones the smallest, all of them ovate, convex, and, at the apex, cut into three or four small teeth: the nature of these is somewhat membranaceous, the color nearly white (f. f. 8, 10).

Stipules about twice the width of the stem (f. 7), of a somewhat quadrate figure, very convex, deeply cut into four acute segments. In texture they resemble the leaves.

Male FRUCTIFICATION situated in the axilla of the perigonal leaves, one or two in each, spherical, reticulated, firmest short, white, slender.

Female FRUCTIFICATION terminal on short proper footstalks, which originate at the base of the branches, and from their under side.

Calyx submembranaceous, nearly white, oblong, approaching to ovate, cylindrical at the base, at the apex somewhat plicata, the mouth crenate-dentate.

Colyptra obovate, whitish, reticulated, tipped with a short style.

Peduncle about three-fourths of an inch long, white, rather firm, peltoid, cellular.

Capitate oblongo-ovate, deep brown, splitting into four equal, lanceolate valves.

Seeds and epical filaments fulvous brown, the former spherical, the latter composed of a double hair.

The var. *β* differs in being more regularly pinnate, and of a much larger size: but the leaves, though more closely imbricated, agree, as well as the stipules, in every essential particular with those of *α*.

BRITISH JUNGERMANNIÆ.

(*J. replant.*)

The species here figured and described, which scarcely yields in beauty to any one of the genus, may be considered as one of the most universally dispersed throughout Europe. In habit, it is closely allied to *J. trilobata*, having, like that plant, its leaves imbricated on the upper surface, large dentate stipules, flagella beset with leaf-like scales, and a whitish membranaceous calyx, proceeding from the under side of the stems. The var. β , though differing at first sight so materially from α , is distinguishable only by its great size and bipinnate ramification. The extremities of the uppermost pinnae, indeed, are almost always obtuse; those of the lower ones attenuated. This var. is rarely found in fructification, Miss Hutchins alone having been so fortunate as to meet with it in that state.

REFERENCES TO THE PLATE.

FIG.

1.	Male plant, natural size.	
2.	Portion of the same, magnified	3
3.	Perigonal leaf and stamens	2
4.	Stamen	1
5.	Female plant, natural size.	
6.	The same, magnified.	6
7.	Portion of the stem with leaves and stipules, seen from below	3
8.	Calyx cut open, to show the calyptra	4
9.	Exterior perichætial leaf	4
10.	Interior perichætial leaf	4
11.	Spores	1
12.	Var. β . natural size.	





Jungermannia trilobata

JUNGERMANNIA TRILOBATA.

(TAB. LXXVI.)

JUNGERMANNIA L., caule repente, flexuoso, subramoso. Folia adpressè imbricata, ovata, convexa, obtuse tridentata. stipulis lato-subulatis, crenatis. Fructus a parte inferiore caulis egredientes, calycibus oblongis, subconstrictis, ore lateraliter fissis.

Jungermannia trilobata. Linn. *Syl. Pl.* p. 1295. *Fs. Suec.* p. 401. Wall. *Plant. Crypt.* p. 118. Wahlenb. *Spor. F. Goss.* p. 144. Schrank, *Bayer. n.* p. 427. Villars, *Delpk. n.* p. 244. Lohr, *Herb.* p. 234. *Enum. Pl. Fl. Dan.* p. 42. Hudn. *Angl.* p. 513. Roth. *Geran.* p. 390. Linn. *Syst. Nat. ed. Gmel.* i. p. 1242. With. *ed. 3.* i. p. 859. Linn. *Encycl. Meth.* i. p. 281. Lamarck, *Pl. Fr. ed. 2.* i. p. 432. Wahlenb. *et Muhl.* *Crypt. Germ.* p. 400.

Jungermannia radicata. HOFFM. *Germ.* p. 87. *Engl. Bot.* t. 223?

Muscoides terrestris repens, ex obliquo ciliata, foliis superioribus et inferioribus ad extremum dentatis. Michx. *Nor. fenn.* p. 10. t. 8. f. 2.

Jungermannia contorta rurex, foliis descendenticulis, imbricatis, tridentatis. Hall. *Hist.* vi. p. 59. n. 1866.

β. nitens; omnibus partibus duplo minoribus.

Jungermannia triangularis. SCHULCHER. *Cesl.* 2.

γ. nitens. Folia valde minutis, undulatis, distantibus, sæpe bidentatis integrisque.

Hab. Subalpine parts of Great Britain, Scotland, and Ireland. β is found in more elevated situations, among rocks, and γ has been discovered in Ireland by Miss Harkness.

Plant growing in large and generally dense patches, sometimes being more than a foot in diameter, throwing out a few fibrous radicles which are often forked, from the lower surface of the stem (f. ii.).

Stems from three to five inches in length, creeping horizontally upon the ground, and imbricating each other; sometimes simple, and erect here and there with innovations, at other times once or twice branched in a dichotomous manner. Herbage rather rigid, of a brownish color. Flagella abundant, about an inch long, tapering, descending from the under side of the stem, where they have their origin, each at the base of a

Stipule they are beset with minute foliaceous scales, jagged at the extremity, which seem to be the rudiments of leaves and stipules. Immediately at the base, however, these are imbricated all round.

Leaves more or less closely placed, and imbricated on the upper side of the stem, horizontal, distichous, attenuated, of an ovate figure, cut at the end into three obtuse teeth. They are of a firm texture, composed of small roundish reticulations. The surface is a little shining, of an olive green color, varying with more or less of a brown tint, in proportion as they are more or less exposed to the sun (f. f. 6. 9).

Perigonal leaves situated upon short, proper branches, or innovations (f. 6), closely imbricated, so as wholly to conceal the stem and stipules, their form is narrow and ovate, with a remarkably ventricose base, the end, as in the cauline leaves, cut into three, and sometimes four, obtuse and usually unequally-sized teeth.

Perichætal leaves embracing the base of the calyx, composed of small ovate membranaceous scales, jagged at the extremity.

Stipules, one to each pair of leaves, widely subquadrate, notched.

Male Fructification situated in the axilla of the perigonal leaves (f. f. 8. 11).

Ather spherical, reticulated, terminating a small white filament.

Female Fructification standing on short, proper footstalks, arising from within the stipules, from the under side of the plant, curved upwards.

Calyx nearly two lines in length, oblong, narrower upward, the mouth slit down on one side, destitute of teeth. Its *testes* membranaceous and reticulated under a highly magnifying power; its color nearly white.

Calyptra oblongo-obovate, tipped with a short style, splitting vertically for the emission of the capsule (f. 14).

Peduncle from an inch and a half to two inches long, somewhat flexuose, pallid, white, cellulose.

Capitate ovate, dark shining brown.

Seeds and spiral filaments brown: the latter composed of a double helix; the former spherical.

The var β and γ differ principally from α in size: the β being intermediate, about half the usual size of α , yet, in other respects, resembling it. Its fructification, as I have lately ascertained by a great profusion of specimens gathered in Switzerland, is precisely the same. γ has more distantly-placed leaves, and these so small, that they are scarcely visible to the naked eye. Of the teeth, there are frequently only two, and sometimes none.

Jungermannia trilobata, although no uncommon inhabitant of various alpine countries in Europe, still does not appear to have been described by any author in perfect fructification. Roth's character of this state of the plant so ill accords with our own, that I cannot help suspecting that he must either have mistaken *J. quinquevittata* for it, or else have confounded the two. In this country, I am not aware that even calyptræ have been found, and I have been obliged myself to have recourse to German individuals for the whole of the drawing of the fructification.

BRITISH JUNGERMANNIÆ.

J. trilobata.

Dillenius has no where noticed this plant, nor does his Herbarium, at Oxford, possess a specimen. The Dillenian synonym of most authors belongs to *J. quadridentata*. Micheli's figure is too accurate to be mistaken.

The affinity of this plant with *J. reptans*, I have already noticed under that species: but it is not of such a nature as to render it necessary for me to point out how they differ specifically.

Dr. Mohr's remark in his excellent *Cryptogamic Flora of Germany*, on this *Jungermannia*, is too excellent to be omitted. "Variet. eximie magnitudine, foliis laxioribus, densioribus, brevioribus, longioribus." he adds, that, "in omni fere globi terrarum regione provenire videtur."

REFERENCES TO THE PLATE.

N.º.

1.	<i>J. trilobata</i> , natural size, female plant.	
2.	Male plant, ditto.	
3.	Var. β , ditto.	
4.	Var. γ , ditto.	
5.	Female plant, magnified	6
6.	Under portion of a male plant, showing also the stipule	4
7.	Var. γ	4
8.	Portion of a flagellum	3
9.	Leaf and stipule	2
10.	Stipule	1
11.	Perigonial leaf	4
12.	Anther	1
13.	Calyx and perichætal leaves	5
14.	Corolla	2
15.	Seeds and spiral filaments	1
16.	Roots	1





Jungermannia Lyellii





Jungermannia hibernica.

JUNGERMANNIA LYELLII.

(TAB. LXXVII.)

JUNGERMANNIA, fronds oblong, suberect, tenerr, costis, margine subintegerrimis: fructu e superiore parte frondium, calyce duplice; exteriori parvis, margine lacinolato-dentato; interiori longè exsertis, cylindraceo, subplicato; calyptri calycem subexcedente.

HAB. Bogs in the New Forest, Hampshire, and at Drumby Ayr, a waterfall on the Norman, Angushire. *Mr Lyell*.—Bogs among *Sphagnum latifolium* and *Hookeria lucida*, near Bantry, Ireland. *Miss Hutchins*.—From some indifferent specimens, gathered at Tunbridge High Rock, *Mr Foster's Habitat*, in the "Tunbridge List of Plants," it is, probably, the "*New Marchantia*," mentioned in that work.—(Bears fruit in May.)

PLANT growing in small loosely-matted patches.

Roots not very numerous, simple, pellucid, almost colorless, proceeding from the nerve on the underside of the plant.

Frond generally about an inch long, sometimes twice, or even, though very rarely, three times that length, horizontally appressed to the earth, or to the substances on which it grows, of an oblong shape, being two or three lines in diameter, and nearly linear throughout, simple, or throwing out one or two lateral short branches (f. 7), or forked at the extremity (f. f. 1. 19); the margin waved, frequently entire, now and then beset with a few distant, unequally-sized teeth; in the centre of the frond, and running the whole length of it, is seen a very distinct nerve, rather prominent on both sides; the interior substance of this is hard and rigid (f. 4), and quite unlike that of the rest of the plant, of which the texture is remarkably thin and delicate, much more so than in *J. epiphylla*, and approaching nearer to that of *J. farctata*. The reticulation is small, and the creaser roundish—the color a pale but pleasant green.

Innovations (f. 20) are not unfrequent on this plant, arising from the underside of the nerve, as in *J. farctata*. In these, at first, nearly the whole breadth of the young shoot is occupied by the nerve, but they gradually bear a nearer resemblance to the parent plant, become furnished with roots, and are detached from the old frond. Sometimes these innovations are simple (f. 21), sometimes forked or branched, as is represented at f. 22.

Male Frustrification (L. f. 1 to 4) situated upon the nerve on the upper side of the frond, generally near the middle or base, and always on distinct plants from those which produce the capsules.

(*J. Lyell.*)

BRITISH JUNGERMANNIÆ.

Perigynial scales (f. 4) numerous, crowded, sometimes forming a beautiful fringe on each side the nerve (f. 4), at other times altogether concealing it (f. f. 2. 3); they are, each of them, of an ovate or roundish figure (f. 5), much laciniated and toothed, concave on the underside. Among these scales

The *Stalks* are dispersed (f. f. 3. 4), each of them (f. f. 5, 6) roundish-ovate, yellow-brown, supported upon a very short white footstalk.

FEMALE FRUCTIFICATION placed always on the nerve, on the upper surface of the frond, and generally near the centre.

Calyx double: the exterior (f. f. 8. 10) the shortest, and very much cut and laciniated at the margin, its texture nearly resembles that of the frond, or, if any thing, is rather more delicate: the reticulation, too (f. 11), is composed of more oblong areole: the interior (f. f. 9. 15. 19) is still more delicate (f. 14), of a paler color, thrice or four times the length of the outer one, subcylindrical, a little plicate and toothed at the mouth, at length torn on one side by the bursting forth of the capsule (f. 18).

Germs at first ovate (f. 15), tipped with a short, obtuse style; afterwards lengthened out, so as to equal and often exceed the inner calyx.

Calyptre (f. 18) cylindrical, of a rather thick subcarteous substance (f. 13), white, with very minute oblong reticulations. Near its base are a few abortive pistilla.

Peduncle nearly an inch long, white, succulent, semipellucid, a little flattened.

Capsule oblongo-ovate, splitting into four, or sometimes only three, valves, and these are not unfrequently united at their apices, as is the case with *J. Hookeri* and some other species. Color rather a pale brown or chocolate.

Seeds numerous, minute, spherical, fulvous. *Spiral filaments* of the same color, very long, formed of a double helix, closely twisted.—Whether these are attached, as in *J. epiphylla*, to the base of the capsule, or at the extremity, as in *J. pinguis* and *J. farcata*, I am unable to determine, for want of specimens in a sufficiently good state of preservation.

I have observed no *Gemmae* on any specimens that I have yet met with.

To none can this species be with more propriety dedicated than to its discoverer, Charles Lyell, Esq., a gentleman in whose unwearied researches almost every page of this work bears unequivocal testimony, and to whom I am happy in being able thus publicly to express my gratitude and esteem, while every one who is acquainted with him, will agree with me in saying,

"E a me suis meriti

"E f. ingegno non stanco

"Tra pietate e carmi e studi, e il cor al fuoco,

"Costumi orati, e il viver dolce e cheto,

"Anche son noti."

It was in the neighbourhood of his seat, Bartley Lodge, in the New Forest, Hampshire, that my valued friend first met with this highly curious plant, which he has since found in boggy places on his estate at Kinsordy, in Antrimshire. It grows likewise in Ireland, and I have the same species given me by Mr. Dickson, who says it was gathered in the East Indies. The following, *J. Aibernica*, although so nearly allied to this, I believe to be perfectly distinct. It abounds in

BRITISH JUNGERMANNIÆ.

(J. Lyell.)

general habit, in texture of the frond, in the double calyx, and in the male fructification arising from beneath the perigonal scales, but it is removed from it by the different substance of the nerve, by the more deeply-divided outer calyx, by the shortness of the Corolla, and by the differently-shaped, and distantly-placed, perigonal scales. I have received several *Jungermannia*, both from the East and West Indies, which agree in general habit with both these, and which will probably be found to have the same fructification.

REFERENCES TO THE PLATE.

FIG.

1. <i>J. Lyellii</i> , male fructification, natural size.	
2. Portion of the same, magnified.	6
3. Smaller portion	4
4. Part of the frond, with a portion of the internal substance of the nerve	4
5. Perigonal scale and Anther	3
6. Anther	1
7. Young female frond, natural size.	
8. Young calyx, magnified	4
9. Calyx, more advanced	4
10. Exterior calyx laid open	3
11. Portion of ditto, to show the reticulation	3
12. Inner calyx laid open, to show the corolla	3
13. Transverse portion of the corolla	9
14. Portion of the inner calyx	3
15. Calyx, cut open to show the germs	4
16. Capsule bursting	3
17. Seeds and spiral filaments	1
18. Cluster of female plants, magnified	8
19. The same, natural size.	
20. Single frond, with innovations, natural size.	
21. Portion of ditto, magnified	6
22. Innovation	4

JUNGERMANNIA HIBERNICA.

(TAB. LXXVIII.)

JUNGERMANNIA, frondē oblongā, dichotomā, tenaci, costatā, margine integerrimā: fractis a superiore parte frondium, calyce duplici; exteriorē parviori, laciniato, interiorē longē exserto, ovato-cylindraceo, subplicato, calyptrā calyce interiorē multo breviorē.

HAB. Among *Sphagnum cuspidatum* and *Jungermannia emarginata*, on the shores of Lough Bray, a very elevated situation, near Dublin. Dr Topler.—Callow, near Kilmordy, Angushire. Mr. Lyell.—(It produces ripe capsules about the middle of April.)

PLANT growing intermixed with various Mosses and other *Jungermannia*, in small, loosely-outangled, imbricated patches.

Roots few, and principally proceeding from the lower parts of the frond, small, fibrous, pellucid, simple.

Frond from two to four inches long, procumbent, oblong, about two, ac, towards the extremity, where it is always the broadest, even three lines in diameter, once, twice, or even thrice branched, the fertile plants the most so, and always in a dichotomous manner: the branches sometimes very patent. The whole plant is more or less waved or undulated, but especially at the margins, which are quite entire, never producing teeth, as in *J. Lyelli*. Like that plant, the substance is very delicate, pellucid, reticulated; but the nerve scarcely differs from the rest of the frond, except in its thickness, and in the more compact situation of the cellular, never having its internal substance so hard, I might almost say, ligneous, as in the last-mentioned species. The color is a pale green, at the base yellowish brown.

I have seen no fasciations on this species.

THE MALE FRUCTIFICATION (f. f. 3 to 4) is produced upon the nerve on the upper side of the frond, as far as I am able to discover, always on distinct individuals from the female.

Perigonial scales few, distantly placed, arising from the top of the nerve, and closely appressed to it, but having an oblique direction, alternately pointing to the right and left (f. 3), and extending nearly the whole length of the plant; each of them is of an ovate figure, convex on its upper surface, at the margins slightly and irregularly toothed. (f. f. 4. 5. 6.)

(*J. hibernica*.)

BRITISH JUNGERMANNIÆ.

One or two *stichs* are situated upon the nerve, and are entirely concealed by the perigynial scales. They are (f. 7) nearly spherical, of an olive-green or brownish color, placed on a very short, pulvinate footstalk.

FEMALE FRUCTIFICATION arising from the upper side of the nerve of the frond, near the middle or upper extremity.

Calyx double: the exterior one short, and cut nearly down to the base into lanceolate divisions or lacinae, which themselves are toothed or lacinated at their margins (f. 8): the texture is altogether that of the frond, whilst the inner calyx is, on the contrary, more delicate, of a paler color, thrice the length of the outer, obovate, approaching to cylindrical, at the mouth cut down on one side, and slightly toothed. Such are the characters of the full-grown interior calyx, which are quite different from its young state: this, even after the perfection of the Germen, is shorter than the exterior one, egg-shaped, and slightly toothed or notched at the margin (f. 9).

Germen ovate, dark green, tipped with a rather large, hollow style, and surrounded at its base by several linear-lanceolate, abortive pistils (f. 9).

Corolla white, between membranous and carmine, ovate, never exceeding half the length of the inner calyx.

Peduncle no inch or more in length, white, sacculate, flexuous, and cellular.

Capsule oblongo-ovate, opening into four, or sometimes only three, valves, which are often united at their apices by the twisting together of the filaments.

Stam. falcate brown, filaments of the same color, closely and spirally twisted in a double helix, and apparently attached in various parts of the inner valves of the capsule.

Germen none, that I have yet seen.

I exceedingly lament, that the perfect fructification of this species was not discovered (all after the annexed plate was finished by the engraver). By means of it, I am the more confirmed in the distinct nature of the species, though, even from the less complete specimens, there appeared to be sufficient characters to enable a botanist to distinguish it from *J. Lyallii*. It is altogether a larger and more branched plant, divided always in a dichotomous manner; and furnished with a nerve, not essentially differing in substance from the rest of the frond. I have noticed, under *J. Lyallii*, how the calyx and the corolla differ in the two species: an equally remarkable difference, and, as far as my observation has gone, an equally constant one, exists in the perigynial scales. In *J. Lyallii* they are rounded, deeply cut at their margins, thickly clothing the sides, and frequently the top of the nerve, and not closely appressed to it. In *J. hibernica*, on the contrary, they are distantly ranged, and point obliquely and alternately to the different sides of the nerve. The latter appears also to be an alpine plant, having hitherto been found only in very elevated situations. In the supplement of this work will be given figures of the perfect capsule.

BRITISH JUNGERMANNIÆ.

(*J. hibernica*.)

REFERENCES TO THE PLATE

FIG.

1. *J. hibernica*, young female plant, natural size.
2. Male plant, ditto.
3. Male plant, magnified 6
4. Portion of the male frond 4
5. Perigynial scale, upper side 9
6. Perigynial scale, lower side 2
7. Anther. 1
8. Female plant, with young fructification 6
9. Calyptra, interior and exterior, cut open to show the Germen and barren pistillo.





Jungermannia trichomanes

JUNGERMANNIA TRICHOMANIS

(TAB. LXXV.)

Jungermannia a caeruleo repens, subsimplicis foliis latis et orbiculatis horizontalibus, convexis nervis integris submarginatisque, et pella rotundata immixto-emarginatis; fructu laterali calycibus subterraneis, oblongis, capsulae bacculae ore crenata.

- Jungermannia Trichomanis*. DICK. *Pluk. Crypt. Eur.* t. 8. f. 3. SCHWABER. *Saxoni. Lief.* 1. p. 7. SCOT. *Cort.* 11. p. 745. THOM. *Prodr.* 17. *Megap.* 11. 171. WARR. *Brit. Pl. Good.* p. 148. GROSS. *Flora. Pl. Pl. Linn.* p. 43. HERB. *Gen.* p. 395. LINN. *Scot.* 11. p. 767. SWARTZ. in *Art. Nov. Lp.* 11. p. 243. *Flora. Bot.* 1. 1876. MICHX. *Fl. Crypt. Germ.* p. 405. WART. *Lepp.* p. 387. SCHWABER, in *Wetter. Annot.* p. 24. t. 4. f. 8. SCHWABER. *Musc. Hepat. Prodr.* p. 10.
- Jungermannia violaria*. SCHWABER. *Mus. de Jung.* p. 91. f. 17. and 18. (*Genus*.) LINN. *Fl. Fr.* ed. 2. 1. p. 473. *Fl. Gall. Syn.* p. 92. *Encycl. Bot. Suppl.* 11. p. 103. WARR. *Bot.* 11. p. 573. SCHWABER. *Spic. Pl. Linn.* p. 103.
- Jungermannia* *Spic.* 11. p. 103. *Cort.* 11. p. 749. LINN. *Scot.* 11. p. 767. *Flora. Pl. Pl.* p. 43. SWARTZ. in *Art. Nov. Lp.* 11. p. 244. VILLANZ. *Delph.* 11. p. 424. LAMARCK. *Fl. Fr.* ed. 2. 11. p. 489. *Fl. Gall. Syn.* p. 92. *Encycl. Bot. Suppl.* 11. p. 103.
- Jungermannia spicata*. WARR. *Bot.* ed. 2. 11. p. 574. LINN. *Spic. Nat.* ed. 6. p. 1349. *Reich. Cart.* p. 484.
- Alium Trichomanis*. LINN. *Sp. Pl.* p. 1579. *Syst. Nat.* 1. p. 701.
- Alium farnum*. LINN. *Sp. Pl.* p. 1579. *Syst. Nat.* 11. p. 701.
- Jungermannia, foliis jungermanniæ, pennis, ocellis, distichis. extrema caule stylato*. HALL. *Hist.* 1. p. 87.
- Jungermannia, foliis didymatis in apice fragiferis*. HALL. *Hist.* 1. p. 89.
- Malum Trichomanis facie, foliis didymis*. DILL. *Hist. Musc.* 1. 31. f. 6.
- Malum Trichomanis facie, foliis integris*. DILL. *Hist. Musc.* 1. 31. f. 5.
- Jungermannia terrestria repens, foliis et rotunditate acuminatis. bifidis, aperturâ pene crenatis*. MICHAEL. *Nov. Gen. Pl.* p. 8. t. 5. f. 14.

HAB. In moist places on the ground, on heaths, in woods, and in marshes, in various parts of England, Scotland, and Ireland.— It produces capsules during most of the summer months, if the weather be moist, and Germs early in the spring.)

PLANT growing in large, dense, or scattered patches, frequently covering a considerable surface of ground.

Stems (f. 6) descending from the under part of the stem, most abundantly near the base, in small, slender bundles, that are placed close by the stipules.

Stems from one to two inches long, slender, flexuous, procumbent, simple, or prostrating, here and there, young stems or innovations, which exactly resemble the parent plant: their texture is delicate: the reticulae large, oblong: the color a pale green.

Leaves rather closely arranged, and imbricated over the upper surface of the stem, or so elongated to conceal it, usually small at the base and at the extremity of the plant, largest in the middle, where they are not infrequently half a line long; their direction is horizontal, their figure widely ovate, above convex, many of them are entire, whilst others are cleft with a wide and obtuse notch at the apex (f. 8); the margins are every where free from serratures. The reticulae are large and roundish, and give the leaves a pinnatifid appearance when the plant is dry: the texture delicate: the color a pale, and sometimes a glaucous green.

Stipules (f. f. 3 & 8.) Of these one is placed between each pair of leaves. Their figure is reniform, and they are furnished with a deep, and somewhat linear incision or notch at the apex, resembling, in some degree, that of *J. convolvulus*. In color and texture the stipules resemble the leaves.

Male Fructification unknown.

Female Fructification lateral, and issuing from the under side of the stem.

Calyx (f. 9) attached by one side of its mouth to a short pedicel, as much a member as that the rest is pedicel, and deeply imbedded in the cell. It is a line or more in length, oblong, widest at the base, of a coriaceous substance, though, when viewed under a high magnifying power, evidently cellular: its exterior is covered with rather long but not thickly-placed hairs (f. 9) pointing upwards.

Corolla (f. 7) ovate, topped with a thick style, and bearing upon various parts of its surface narrow pliculae, which are of an oblong form (f. 8), transversely and longitudinally striated.

Corolla (f. 10), when arrived at its full size, occupying the whole width of the calyx, and reaching to about half its length, its form is ovate, its texture delicate and membranous.

Footstalk about an inch or an inch and half long, slender, whitish, cellular, at its base inserted into its receptacle by means of a small bulb (f. 11).

Capsule (f. 12) linear-oblong, having the four lower valves, of which it is composed, very curiously and spirally twisted (f. 13). They unfold in some degree, but never become straight in expanding, and, after the discharge of the seeds, again become twisted and reflexed. Their interior is extremely beautiful. Under a high power of the microscope, longitudinal brown furrows are seen, having intermediate narrow ones (f. 14) and these are connected by transverse lines.

Seeds small, numerous, of a roundish form, and of a brownish color, as are the spiral filaments, which are, moreover, long, slender, and very closely twisted, formed of a double tube.

Spores (f. 16) abundant upon those plants which have their apices longitudinal not into almost hollow portions of the stem, at the point of which they are collected together in small spherical clusters, resembling those of *J. Monopodium* and *Sphagnum*. Each particle is roundish, angular, pitted, pale green.

Numerous as are the above synonyms, I am very far from sure that I have brought together all that really belong to the species, one of the most decidedly marked in the whole Genus, yet one which appears to have been less understood than almost any other. Wherever Dillenius has committed errors, they have been copied and multiplied by succeeding writers, and we stand but little chance of having them corrected, without recourse to the original specimens of this author, which, fortunately for science, are still in existence. By an examination of these specimens, it is clear that Dillenius figures 5 and 6, of tab. 31, are right, and be no more infrequent varieties of the same plant; nor, these have been quoted under no less than six different names. It would be neither a pressing nor a useful task, to point out the errors of the older authors in their accounts of this species. Our countryman, Dickson, first well established it under the name of *J. Trichomanes*, and has given a tolerably good figure of it. The magnificent representation of the leaf, indeed, is inaccurate, but altogether it does not merit the appellation which Muhl. has applied to it of "poema." The part of the *Flores Cryptogamicæ Germanicæ*, of the last-mentioned author, containing the *Jungermanniæ*, I have but lately received, and I am greatly disappointed in the assistance I had hoped to have derived from it. In his character of the species, which forms the subject of the present description, he has left undisturbed every thing that concerns the fructification. On his *Gemmae* he has compared it with *J. pollicar* & *J. pulchella*, Linn., with which it has little in common; he has referred to Dillenius (though doubtfully tab. 60 f. 2. not *J. minor*) as a writer; and he has thought Dickson's *J. serpyllifera* to be a synonym, that which nothing can be more unlike to it, the essential characters.

Wahlenberg, with great propriety, observed, in his valuable *Flores Lapponicæ* "*Stipularum* forma nonnulla in *J. arctica* (aut *J. serpyllifera*) *filix* sed folia *diversissima*, reversa ovata et semper dupli. majora et muc. hyalina et glaucogenta, quæ sola habuit. fol. in a *plurima* affinitas *diversitate*. Defective *stipulam* *fulvum* *certumque* *characterem* *ovale* *capitula* *oblonga* *in* *et*." He is equally correct when he says that the figure in English *Botany* "*stipula* *serpyllifera* *rebit*."

I have already had occasion to notice, under *J. strictum*, the peculiarities which this species has in common with that; and, at the same time, I pointed out the characters that distinguished them, which, indeed, are sufficiently apparent, even to those who are not very conversant with the Genus. The hairy calyx, and twisted capsule are very remarkable, and circumstances which I believe are confined to the present plant. Others are at present unknown. The heads of *Gemmae* are born on elongated, nearly leafless portions of the stem, exactly as in *J. limbulata*, and like that plant, too, the texture of the leaves and capsule is very delicate.

REFERENCES TO THE PLATE.

FIG.

1. Female plants, natural size.	
2. Gemmiferous plant, ditto.	
3. Female plants, magnified	6
4. Gemmiferous plant	6
5. Portion of the stem and leaves, seen from the underside, showing the roots and stipules	4
6. Stipule	3
7. Calyx dissected, showing the germs and barren pistilla	3
8. Barren pistillum.	1
9. Calyx, exterior of	3
10. The same dissected, to show the full-grown corolla occupying the whole width of the calyx, and the receptacle of the peduncle	3
11. Base of the peduncle, with its bulb	3
12. Capsule about to burst	2
13. A valve, after the capsule has burst	2
14. Portion of a valve, showing its structure	1
15. Seeds and spiral filaments	1
16. Germes	1





Jungermannia capitata

JUNGERMANNIA CAPITATA

(TAB. LXXX.)

Jungermannia, caule prostrato, simplicinervis, foliis rotundato-quadratis, inferioribus bilobis, reliquis tri-quadrifidis fructu terminali, calycibus oblongo-ovatis, subfimbriatis; ora contracta, dentata.

HAB. Cadnam Bag, New Forest, Hants, and Lyndhurst Race-course, in the same county.
 Mr. Lyell.—On a rock in a dry mountainous situation near Bantry, Ireland. Miss Hutchins

PLANT growing in very small pale-green patches, on a turf soil, and having much the general appearance of small tufts of *J. sacca*.

Roots rather numerous proceeding from nearly the whole length of the underside of the stem, pellucid simple fibrous.

Stems a quarter of an inch or rarely half an inch long, rather stout in proportion to their length, almost always simple (in one or two instances, only, I have observed a solitary lateral shoot, f. 1) the color greenish, sometimes, but especially towards the base, dingy brown. The texture remarkably fragile.

Leaves rather closely ranged in two rows, sometimes patent or nearly horizontal, at other times, and generally (f. 3) nearly erect, of a roundish figure, approaching to quadrate; those at the base smallest and simply lobed, whilst the rest gradually increase in size as they approach the extremity, and are both trifid and quadrifid. The segments unequal a little waved and acute. At the very apex, particularly of the sterile shoots, the leaves are collected into a head or cluster, whence the specific name. Their texture is delicate, and the cellules large in proportion to the size of the plant. of a roundish shape, or often, as Mr. Lyell remarks, truly hexangular. Their color is rather a pale yellow-green.

Perichaetial leaves large, with four or five, very unequal, incurved segments (f. f. 7-8).

MALE FRUCTIFICATION unknown.

FEMALE FRUCTIFICATION terminal.

Ovary large for so small a plant, oblongo-ovate, greenish, a little diaphanous towards the extremity, and pilose, at the mouth somewhat contracted, and very unequally toothed.

Peduncle a quarter of a line long, white, cellulosæ, a little waved.

(*J. capitata*.)

BRITISH JUNGERMANNIÆ.

Capsule ovate, dark brown, splitting into four equal valves.

Stems and spiral filaments fulvous. the latter composed of a double series, attenuated at each extremity.

It is not easy, in a specific character, to define the differences which will keep this plant separate from *J. erlae*. In the fructification, and in the form and size of many of the leaves, they seem perfectly to accord; but in all the specimens I have examined, both from Ireland and the New Forest, the upper leaves of *J. capitata* are collected into a tuft or head, which gives the plant a very remarkable appearance. These terminal leaves, too, and most of those not inserted near the base of the plant, are either trifold or quadrifid, and the segments are very irregular; but, what is more striking, the texture of the leaves is delicate, fragile, and composed of cells as large as those of *J. decurpidata*. In this particular it differs essentially from *J. incisa*, which has similar tufts of leaves at the extremity of the shoots; but they are never, in our plant, toothed or jagged at the margins of the segments.

REFERENCES TO THE PLATE.

FIG.

- | | |
|---|---|
| 1. Sterile plants of <i>J. capitata</i> , natural size. | |
| 2. Female plant, natural size. | |
| 3. Sterile plant, magnified | 6 |
| 4. Cauline leaves | 3 |
| 5. Cauline leaf, showing the cellulae | 3 |
| 6. Terminal leaves | 3 |
| 7. Perichatral leaf | 3 |
| 8. Perichatral leaf, with plaitia appearing before the formation of the calyx | 3 |



1

2





Jungermannia complanata

JUNGERMANNIA COMPLANATA.

(TAB. LXXXI.)

JUNGERMANNIA, caeruleo repens, vagè tumoso: folia disticha, superne imbricatis, inaequaliter lobatis; superioribus majoribus, orbiculatis; inferioribus ovatis, appressis, planis: stipulis nullis: fructu terminali, calycibus oblongis, compressis, truncatis.

α. MAJOR, folia planiuscula, pallide viridibus.

Jungermannia complanata. LAM., *Syst. Bot.* ii. p. 706. *Sp. Pl.* p. 1133. *Fl. Suec.* p. 929. THUN. *Prodr. Fl. Megop.* n. 868. *Fl. Dor.* t. 1069. CRANTZ, *Inst.* p. 84. SCOP. *Cern.* ii. p. 345. NACH. *Meth.* p. 149. WALS., *Crypt.* p. 124. WEBER, *Spic. Fl. Goet.* p. 146. VILLERS, *Drigh.* iv. p. 925. LAM. *Dict.* ii. p. 999. HOOK. *Aggl.* ed. 2. ii. p. 516. WITT. *Bot.* ed. 5. iii. p. 1073. LICHTE. *Soci.* p. 780. HEDL., *Br. Fl.* p. 286. REICH. *Cart.* p. 418. SUTER, *Or.* p. 311. GOUAN, *Mouss.* p. 459. CART. *Land.* ed. 1. HOOK. *In Lich.* *Land.* ed. 2. EHRH. *Crypt.* fasc. 97. WALS. et MONT., *Crypt.* *Germ.* p. 416. WALS. *Lapp.* p. 390. ENGL. *Bot.* t. 2499. LAM. *Fl. Fr.* ed. 3. ii. p. 434. LAM. *Syn. Fl. Gall.* p. 93. HORT. *Germ.* ii. p. 85. ROTH., *Germ.* iii. p. 603.

Lichen porcus (a corticibus arborum humidis repens, foliis subrotundis, squamulis lacum-lentibus. HALL *Syn.* ii. p. 41. *Hedl.* p. 69.

Jungermannia foliis subrotundis, densissima et imbricatis dispositis, viridis major. ROTH. *Jen.* i. p. 345. ii. p. 394.

Lichenasium patulodes squamosum, majus. Cat. *Glar.* p. 213. *App.* p. 84. i. l. f. D. E. P. *ic. Fl. Lichenasium imbricatum majus.* Cat. *Glar.* *Suppl.* p. 179. 174. i. l. 15.

Jungermannia foliis circinnatis curvis imbricatis dispositis ex viridi flavescens. MICH. *Nov. Gen. Pl.* p. 7. L. 5. f. 21.

Lichenasium imbricatum, majus, squamis compressis et planis. DILL., *Musc.* p. 498. t. 72. f. 28.

Jungermannia foliis rotundatis, alterne imbricatis, caule piano multifloro, setis brevissimis. HALL. *Halo.* i. l. n. 1890.

Hepaticoides foliis et succulis Thuget instar compressis major. VALL. *Bot. Per.* t. 19. f. 9.

β. MINOR, foliis convexioribus, fusco-lutescentibus.

HAB. Abundant on the trunks of trees, and there rendered conspicuous by its pale-green color; bearing fructification all the year.—*β* was found in Ireland, near Bentry, by Miss Hutchins.

PLANTS densely imbricated, so as to form wide but compressed tufts, or cushion-like patches.

Stems proceeding rarely from the lower side of the stems, more frequently from the leaves, always in small pencil-like tufts, consisting of peltoid, simple fibres (f. 3).

Stems, or *Stemlets*, from an inch and a half to two inches or more in length, creeping, scirrose, variously branched, the branches again divided in a pinnated manner, and here and there producing innovations. Color green.

Leaves closely imbricated over the upper surface of the stems, and in a bifarious manner, unequally two-lobed, the superior lobe much the largest, orbicular, nearly flat upon the upper side (in β convex); the inferior lobe ovate, appressed, flat, and often shooting forth roots. The color is a very pale yellow-green; in β above yellow-brown. The substance is delicate and flaccid; the reticulation small and obscure (f. 18).

Perigynial leaves (f. 6) similar to the rest, but more ventricose at the base, where the Anthers are situated.

Perichætal leaves also but little differing from the median ones, except in having the two lobes more equal in size (f. f. 9, 9).

Stipules none.

MAIN FRUCTIFICATION situated in the axils of young lateral shoots (f. f. 9, 4).

Anthers two or three in the axils of each leaf, globose, reticulated, yellowish, supported on cellular, whitish, short footstalks (f. f. 6, 7).

FEMALE FRUCTIFICATION terminal upon the branches, and on the lateral shoots (f. 8).

Calys oblong, from a cylindrical base becoming wider, compressed, and at the extremity quite flat, incurved before the putting forth of the capsule; the apex truncate, nearly entire, or only a little cleft on one side. (In a very young state (f. 9) the calys is shorter and wider than that just described (f. f. 11, 10), but still very much compressed.)

Pistilla five to seven in each calys, oblong, slightly swelling towards the base, at the mouth expanded and toothed, or radiated (f. 12), of a pale and almost white color, faintly striated transversely and longitudinally.

Colypers pyriform, whitish, peltoid, reticulated, tipped with a short style.

Peduncle not more than twice the length of the calys, white, succulent, cellulose.

Capsule ovate, pale brown, transversely and longitudinally fissured (f. 13).

Seeds rather large, spherical, brown, as well as the spiral filaments, which are formed of a double helix.

Gemmae are attached to the margins of the leaves in the spring months (f. f. 9, 15), and are of various sizes, of a roundish or ovate figure (f. 16), compressed, evidently reticulated, so as to resemble in texture the leaves.

Jungermannia complanata is a species but little subject to variation, nor have I seen any appearance of it sufficiently unlike the common to be worth mentioning, except the small brown one found on rocks in Ireland, by Miss Haickin, and described above, and represented at f. 17.

Although, in general habit, evidently allied to that beautiful family to which *J. Tenax*, *J. dilatata*, *J. platyphylloides*, &c., belong, the plant before us is, nevertheless, abundantly distinguished from them by a total want of stipules, of which part Dr. Roth has, notwithstanding, maintained

BRITISH JUNGERMANNIÆ.

(*J. complanata*.)

the presence, and has given a particular description of them: his words on the subject are, "Quamvis Follia, Scopoli, et Weber stipularum presentiam negant, tamen revera adveni, et vegetis et cunctis locis observo sub lente brachia surgente rith tantum distillagocende. Ad latera scilicet cavila perei intra folia densissima imbricata egrediuntur in aerea paginâ foliisque adprimuntur, structura ex figura cum illis exactè convenientes, licet duplo minores " from all which, it appears that he has taken the smaller lobe of the leaf for stipules.

The circumstance of roots proceeding from the leaves is highly curious, and Wahlberg, I believe, was the first to observe it. We know that the leaves of some mosses (*Hypnum* *lancea* for example) have the property of throwing out roots, but in them it takes place at the margin of the leaves; here from the surface or pagina, and generally from that part which forms the fold between the smaller and the larger lobe. I have reason to think that *J. dilatata* and *J. Tamarisci* possess the same property, and that the small spherules I have figured on the stems and leaves of the former of these species (tab. 5), are the young roots, and the more so, since I have seen the following remark of Wahlberg. Alluding to the leaves of *J. complanata*, he says, "In ejus pagina inferiore versus crum inferiorem papilla protuberat, primum viridis, dein fuscescens et radicans."

Nor are the Gemmæ less worthy of observation. They have the most complete analogy with the Gemmæ of the *Marchantia*, and with those of *J. furcata*, being, like them, evidently reticular; and they are seen to increase in size before they are detached from the plant. Totally different are they in their nature from the Gemmæ of *J. bicuspidata*, *J. ventricosa*, &c.

In point of calyxes, *J. complanata* resembles *J. undulata*, which, notwithstanding the different mode of growth and habit, as it appears at first sight, ought, perhaps, to rank in the same family with that species. There is this striking difference between them, that, in the family in question, the lobules cover the upper or anterior surface of the stem, in *J. complanata* the lower. Such is the case, too, in *J. cochleariformis*, where the lobule is, however, forced into a kind of sack.

REFERENCES TO THE PLATE.

FIG.

1. <i>J. complanata</i> , natural size.	
2. Portion of the same, magnified	6
3. Stem and leaves seen from beneath, to show the lobules and roots . . .	4
4. Antheriferous shoot	5
5. Perigynial leaf, with its anther	3
6. Anther	5
7. The same	4
8. Perichætal leaf	3
9. Perichætal leaf with gemma, and containing a young calyx	3
10. Young calyx, with pistilla	2
11. Calyx, showing its reticulations	1
12. Pistillum	1
13. Segment of the capsule	1
14. Seeds and spiral filaments	1
15. Young female shoot, having gemmae on its leaves.	6
16. Gemma	1
17. <i>Var. β</i> , natural size.	



Jungermannia Masca

2



Судетанна Власа



1. 2. 3. 4. 5. 6. 7. 8. 9. 10.



11. 12. 13. 14. 15. 16. 17. 18. 19. 20.

JUNGERMANNIA BLASIA.

(TAB. LXXXII LXXXIII LXXXIV.)

JUNGERMANNIA, fronds oblong, ramose, costate, infra squamis dentatis sparse imbricatis; marginis lobatis; fructu a superiore parte costæ egrediente; calyx calyptræque intrafrondosis.

Blasia pusilla. LAMX. Fl. Suec. ed. 1. p. 333 ed. 2. p. 405. Sp. Pl. p. 1605. Syst. Nat. p. 707.
 TIMM. Prodr. Fl. Magap. n. 885. CHAMX. Inst. p. 61. t. 1. LINDL. edic. Pl. p. 233.
 WARR. Spic. Fl. Guel. p. 169. HORT. Germ. 11. p. 94. t. 3. HORN. Agri. p. 619.
 WYTH. Bot. Arr. ed. 4. p. 1. p. 868. HALL. Brit. Bot. p. 263. LIGHT. Scot. p. 1112.
 CES. Fl. Dan. t. 45. Engl. Bot. t. 1328. STURM. Deutsch. Fl. Ic. MOER. Fl. Crypt.
 Germ. p. 437. SCHMID. Diss. de Blasia, cum Ic. HEDW. Theor. Fl. Crypt. p. 112.
 t. 28. f. 155 to 164. LAMARCA, Dict. 1. p. 429. Illustr. t. 877. LAM. Fl. Fr. ed. 3. 11. p. 418.
 LAM. Fl. Gall. Sp. p. 90. WALL. Lapp. p. 295. SCHWAB. Musc. Hep. Prodr. p. 36.
Blasia pusilla, *Lichenis pyridæi* facie. MICH. Nov. Gen. Pl. p. 14. t. 7.
Minus Lichenis facie. DILL. Hist. Musc. p. 237 f. 31.
Blasia fronds lobata, lobis subrotundis, nervis setiferis. HALL. Hely. t. 3. p. 57.

HAB. By no means uncommon in the alpine and mountainous parts of England, Scotland, and Ireland generally preferring moist heaths, or sandy ground, which is occasionally inundated.—(It bears soredia in the spring months: Gemmae are found throughout the whole year.)

PLANT growing in patches of various dimensions; the individuals separate, or, as is frequently the case, imbricating one another, like the fronds of *J. singularis* and *J. epiphylla*.

Roots more or less numerous, and crowded on different plants, and even on different parts of the same plant, yet frequently extending the whole length of the underside of the stipe, from which alone they originate: they are simple, fibrous, pellucid, whitish.

Frond lying horizontally upon the ground, yet with the apices often erect, from a quarter of an inch to an inch in length, varying remarkably in figure, for the most part oblong, sometimes simple, or with a single lateral short branch (tab. 64. f. f. 6. 7. and tab. 63. f. f. 2. 12); sometimes more divided, and in a dichotomous manner (tab. 62. f. 2); at other times the ramification seems to be almost palmate (tab. 64. f. 1), having the ends forked: it is to

be observed, that the circumference of the plant, and of the branch itself, are always wider than their base, their width, in the first case, being two or even three times, in the other seldom exceeding a line and a half. It is of more rare occurrence that the frond, from a common source, is branched in a flattened sort of manner, such an appearance is represented in tab. 34 f. 9, where the spaces have also a slight disposition to be forked.

The substance of the frond is between cartilaginous and membranaceous, thicker at the margin, where it is often slightly woody, and contains very and distinct veins of various sizes, but all of them large, at first right giving the appearance of closely set, parallel lines, but the divisions never reach so far down as the nerve. These lines are numerous, often anastomosing, and particularly so towards the extremity of the plant (tab. 35 f. 6). The whole is cartilaginous, and the cells tolerably large, presenting, on the exterior surface, a beautifully reticulated appearance, with acute angles (tab. 35 f. 3 & 4).

Throughout the centre of the frond, and following the divisions of the branches to their very extremity, runs a very evident and broad nerve, most prominent on the underside, and marked on the upper side with numerous lines, as if the uppermost layer is plane or folds (tab. 35 f. 3 & 4, &c.). Sometimes it happens that the nerve is forked within the velocity of a simple branch, where probably the frond is about to be extended in a discontinuous manner, as I have already stated in *J. formosa* (tab. 35 f. 11).

The color of the whole plant is a pale-green, but that of the nerve usually paler than the frond, except when the plant is dry, the latter is often yellow-brown, as if in a state of decay.

On the underside of the spaces, always upon the nerve, and closely appressed to it, are scattered, apparently at unequal distances, small stipularious scales, of an oval form, smooth (tab. 35 f. 10 & 11) and deeply though unequally spinose-dentate. These scales must be carefully distinguished from the granaceous buds or tufts, found not only on the upper, but likewise on the underside of the plant, but they are not confined to the nerve, nor are they ever single or appressed to the frond.

SCALE FRACTURES, as far as I have yet observed, upon different individuals from the Female. (tab. 35 f. 5.)

Others one or three in the same frond, constantly imbedded in the nerve, several, however, only with a very thin scale, and always visible, not only by the different color, but also by a slight swelling of the nerve where they are situated (tab. 35 f. 8). Their figure is elliptical, or nearly so, their color pale greyish. I have not been able to perceive any point of attachment to the side of the frond, so which they are imbedded. It requires a highly-magnifying power to discover the reticulated appearance of the scales (tab. 35 f. 8). Within they are filled with an extremely minute, granulated substance.

PERMANENT FRACTURES arising from the upper side of the frond, and towards the extremity.

The method now that I have observed of it is represented in tab. 35 f. 1 & 2 and tab. 36 f. 4.

In the first of these plates are figured young plants quite expanded, situated at various distances upon the nerve, each of which is nearly linear, but a little swelling at the base, and slightly expanded at the apex, of a greenish color, and striated longitudinally with pale-red, and marked also with a few transverse lines. Another state of the early fructification is given in tab. 36 f. 4, where the plants are represented, equally free from any scale or external covering, collected into small clusters, as they are within a perianthium in every other *Jungermannia* that we are acquainted with (*J. flabellata* alone

empty?) Thus, too, on upon the sides. In the midst of one of these clusters, I found a single perfect ovule like a germ, tab 64 f 5, of an ovate-lanceolate form, and of a greyish-brown color, and topped with a rather large and perforated style.

It might be expected that in a single specimen, the germ would be seen in a more advanced state; but this I could never observe to be the case. On the contrary, the progress of the fructification seems to be altogether uniform. I have not been able to find an ovulated germ more advanced than that above described, but in numerous instances, the developing female, such as are figured at tab 62 f 15,* having an oval reflex on the broad, with a slight depression and apex, or equilateral, in the center. I have never failed to see the germ in different states of advancement upwards, upwards, and they will be better understood, by a reference to tab 62 f 1 2 3 4. The upper individual, at f 15, being dissected longitudinally and exposed to the microscope showed no string below beneath the reflex above mentioned (tab 62 f 21), and within it was a style extending from the umbilical mark in various down to the lower extremity of the hollow or receptacle.

The style is of an oblong-lanceolate and acuminate figure, placed at the top, bladder-like, whitish, membranous, scarcely reticulated, unreticulated, or flat rather like the Corolla, already in such degree as to be of a pyramidal figure, topped with a short, curved style, and of an olive-green color. At the base it is inserted into the receptacle by means of a small bulb. In its progress towards maturity, its increasing size causes the style to burst, and portions of a nucleus attached to the umbilicus (tab 62 f 4), and in the bottom of the germ on the receptacle (tab 62 f 7). The Corolla is now formed of an oblong-ovate figure, and the reticulated appearance of the style covering or subtending is very striking. Advancing still more, the fructification bursts open the upper surface of the broad, in a very irregular manner, always above the reflexion, and rarely at the apex of the broad (tab 62 f 12).

Capitate even when about to burst, scarcely exserted above the opening of the broad, sometimes not at all so, in which case the opening is formed by the capsule.

Peduncle white, erect, from half an inch to an inch long, even, but toward, twisted, and somewhat imbricated.

Capitate cross-globular, whitish at the base, the red pale olive-brown. It opens into four equal, acute valves whose texture is, under the microscope, longitudinally striated, and the lobes of the acule have a dotted appearance. tab 62 f 10.

Seed three, if removed from the fully formed germ or young capsule, are reniform, of an olive green color, co-shaped is a petioled membrane, and lying together in three, though sometimes only two, and rarely four are found in a cluster (tab 62 f 1 2 3 4). In the state of the fructification, too, the filaments are most evidently likewise surrounded by a petioled tube. The ripe seeds fall from the capsule singly (tab 62 f 11), but are still within a membrane, and do not differ from the young seeds, except in being of a darker color. I am positive in relation to the fully formed opened filaments, which are rather long, closely twisted, and formed of a double tube.

* And the same appearance is represented highly magnified, on the female, at tab. 62. f. 15, although the capsule is then closed.

† Such is the case on *J. Blau*.

The *Gemmae* of this plant are of two kinds, and highly curious from their structure, which is perfectly different from that in every other species of the genus yet known, and deserving of very particular description.

I shall first notice those bodies which by most botanists are looked upon as the seeds, whilst their microscopic has been considered the capsule, upon the shape of which, principally, the character of the genus *Stema* has been established. The receptacle is found principally in the spring and summer months, viz. in early May, upon each segment of a frond, always towards the extremity, and always upon the nerve. This, in an early stage, forms a swelling of an oval figure, or even reniform, at the upper extremity furnished with a beak, at first short acuminate and closed (tab. 90. f. f. 4. 10.) at length becoming lengthened out, cylindrical and hollow throughout (tab. 90. f. f. 3. 11.) A system of this (tab. 92. f. 14.) discovers numerous spherical small bodies, enveloped in a perfectly transparent gelatinous mass, and apparently floating in it. Each of these is cellular, subglobular, the cells of very unequal size (tab. 92. f. 15.) furnished with a minute cellular, even before they are discharged from the receptacle. The discharge takes place through the tube, and does so the more readily in dry weather when the fronds collapse, and force the gemmae towards the mouth, where they are often collected into a caputulum by means of the gelatine.

On the dispersion of these *Gemmae*, they fall not only on the ground in great numbers, but on the fronds themselves, where they appear in later, according to the season of the season, develop themselves, becoming tufts of small green scales, scattered over the upper of the frond, where they are retained by means of the lateral margins (tab. 94. f. f. 1. 2. 3.) These apparently in reality unlike the perfect plant, being of an oval figure, druse-like, there is few collected together and resting on their base, which, however, does not seem to have any point of attachment to the frond. As they are removed by the slightest touch. These, it may be supposed, are expanded in an advanced state of their growth the scales taking a different form, and the web becoming almost entirely lobed. The similarity between these scales and those of the under side of the frond is very considerable, but their difference has been already explained.

The second kind of *Gemmae* is situated on the under side of the frond, but never on the nerve. These appear in the form of small, roundish, dark-green dots, within the substance of the plant, but evidently nearer the lower epidermis than the upper, though visible on both sides, no account of their deep color. As they grow older, they become prominent, and form tubercles (tab. 92. f. f. 4. 6. and tab. 94. f. 3.) on the under side of the frond, yet always continuous covered with a slight pellicle, not of which, if the swelling be spread with the point of a hair, the gemmae readily fall, and are then seen to be spherical masses, of a substance between granular and pulpy, almost black, compact, but quite free from any membranaceous covering like the true scales; nor are they at all cellular, like the gemmae just described.

Although, for want of a better term, I have applied the name of *Gemmae* to these bodies, I am far from supposing that these apparently unorganized granules have the same

* That these young bodies should be so unlike the old ones is not so remarkable, when we consider the different appearance of many seedling angiospermous plants from perfect ones, particularly the Bean.

BRITISH JUNGERMANNIAE.

(J. Smith.)

Names assigned to them as they occurred in the receptacles, to which the same application is here given, and which, I think, are clearly warranted to become new plants, like the receptacular gametes of the Marchewort, and like those gametes that I have described as *J. complanata*, *J. subspicillata*, *J. furcata*, and others which happen, analogous to the gametes in question, may be found in what I have in this work called *Gametes of J. loriculata*, *J. nemoros.* &c. (See, upon this subject, a remark under *J. subspicillata*.)

Having now devoted these entire plates, and an equally unmodest portion of letter-press, for the description and illustration of the present species, little remains for me to add in the diagrams, which can lead to a more complete knowledge of the plant since it is my wish simply to state facts as I have seen them, and to avoid every discussion respecting the offices of the respective parts of the fructification. I feel strongly, that the farther I advance in my acquaintance with these curious little vegetables, the greater are the difficulties which arise in the determination of the sexual organs: and I will, for the present, beg to declare myself within the perambles of the Haldimann system, which, ingenious as it is, appears to be fraught with every difficulty, not of that of Richard, one of the most learned botanists of the present age whose theory of "Acrota," as he calls the Cryptogamia of Linnaeus, I am far from understanding as I would wish to do, although I am sufficient to be convinced that it is highly worthy of attentive consideration. I shall content myself with remarking, what I think no one will deny, that, if what, in conformity with the language of Hedwig, have here been called capsules and anthers in *J. repaphila*, be really such, then Indian which are so designated in the present species, are with equal propriety, worthy of that denomination, since the closest analogy in structure and situation, exists between them.

Dismissing them, as I do, bringing forward any arguments on the theory of the fructification in this species, it will not be necessary to enter much at large into a critical examination of the labors of Hedwig and Schrebler, in their Dissertation on the genus *Stictis*, which are judiciously written with a view to ascertain what is the male, and what the female, fructification of the plant in question. Their speculations, indeed, are now completely overturned, by the discovery of what they themselves would undoubtedly acknowledge to be the true capsule.

I cannot, however, resist adding a few words on the genus *Stictis*, which must, in future, be erased from the Flora. It was established by Michx., who says of it, "*Stictis* rerum planarum Junc quidem species Stictis decomposita, a Pal. D. Stictis Bangi Congregatae Vallis-Umbrosae Monacha, Stictis non gurgata, or is *Stictis* loriculata natrix ad Indaganda plantae vasa male vocata." The character he has defined to be: "Fructus grossi, fere masculini, suspensissimi, tubulati, elongatissimi prothuberantibus quadratulum cordatis, et sterili, et alijs carente. Fructus vero sunt speciei vasa filiformia marginata, in quibus deorsum, et phanerum nervum extendit, sublimiter carentia." A figure* is likewise added at tab. 7, but a very inferior one, compared with that given by DeCandolle, in his incomparable *Flora de Haerlem*. This latter admirably represents, though of the natural size, the tubular receptacle, the marginal gametes, and the

* The figure, though extremely good for the use to which it was published, is yet by no means conveying a correct idea of the plant. The lobes of the fruct are not expressed, the marginal gametes are incorrect, and the receptacle of the gametes has too large, and the details are more repeated.

watched its progress so unremittingly, that I had at length the satisfaction of receiving from him specimens in the state represented at tab. 68. f. f. 3. 4. 7. 12; and had soon after, from Anobleside, the still greater pleasure of having forwarded to me, by the same friend, an individual with the capsule burst from the frond. With equal ardor Dr. Taylor commenced his researches in the neighborhood of Dublin, where he had the good fortune to find capsules fully ripe, and discharging their seed, on the mountains at Lough Bray, on the 31st of March, 1814. These he communicated to me, with the remark, that he believed the capsules to be of very short duration; "for that it was not till after repeated visits to the same spot, and a most laborious search each time upon his hands and knees, that he was at length able to discover them. The weather was remarkably warm, notwithstanding a shower of rain."

I have myself seen the plant in the same habitat, and likewise in various parts of England and Scotland, though it is chiefly confined to hilly or mountainous districts. In Switzerland it is very abundant; yet it was only on the Grimsel, in the autumn of 1814, that I ever saw the capsules exerted upon growing plants.

REFERENCES TO THE PLATE.

(TAB. LXXXII.)

FIG.

- | | |
|---|---|
| 1. Two fronds of <i>Jungermannia Blasii</i> ; the one producing marginal gemmae and young tufts, the other having the receptacular gemmae magnified | 6 |
| 2. Plant much branched, with receptacular and marginal gemmae. | 6 |
| 3. Portion of a frond, bearing anthers | 8 |
| 4. Portion of a frond, with young receptacles for the gemmae, the mouth not being yet opened | 4 |
| 5. 6. Portions of a frond, bearing placula scattered on the nerve, and showing the marginal gemmae prominent beneath. | 4 |
| 7. Anther. | 3 |
| 8. Ditto | 2 |
| 9. Portion of the cuticle | 1 |
| 10. Portion of a frond, seen from beneath, showing the scales | 4 |
| 11. Another portion of the same, with a young tuft | 3 |
| 12. Gemma, removed from the substance of the frond | 2 |
| 13. One of the same, broken. | 1 |
| 14. Receptacle of gemma, dissected. | 3 |
| 15. Extremity of ditto, with the gemma terminal | 2 |
| 16. Gemma | 1 |
| 17. Stipularious scale | 1 |

REFERENCES TO THE PLATE.

(TAB. LXXXIII.)

FIG.

1. *Jungermannia Blasia*, two specimens, with perfect capsules, natural size.
2. The same, magnified 6
3. Section of a young female frond, showing the situation of the calyx and germens 3
4. The same more advanced; the calyx being burst 3
5. Seeds and spiral filaments, removed from the germens, f. 4 4
6. The same 1
7. Germens, enveloped in the calyptra, and having a portion of the calyx at the base 2
8. Capsule, unopened 2
9. The same, with the valves burst 2
10. Portion of the valves of the capsule 1
11. Seeds and spiral filaments, from a ripe capsule 1
12. Young female fronds, natural size.

REFERENCES TO THE PLATE.

(TAB. LXXXIV.)

FIG.

1. Large branched specimen of *J. Blasia*, natural size.
2. Portion of a frond, with tufts, magnified 3
3. Tuft, magnified 1
4. Portion of a frond, with tufts and clusters of pistilla 3
5. Young germens and pistilla 1
6. Sterile frond, natural size.
- 7 8. Fronds, bearing receptacular gemmae, natural size.
9. Stellated frond, natural size.



f. antecol.



f. du trifol.



f. latimacul.



f. ad.





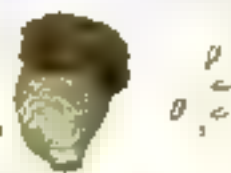




Epilobium



Epilobium



Epilobium



Epilobium



Epilobium



Epilobium



Hand-drawn illustration





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